U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE STATE OF ALABAMA, CHARLES HENDERSON, GOVERNOR; J. A. WADE, COMMISSIONER OF AGRICULTURE AND INDUSTRIES; EUGENE A. SMITH, STATE GEOLOGIST.

SOIL SURVEY OF MONROE COUNTY, ALABAMA.

BY

HOWARD C. SMITH, IN CHARGE, AND AUSTIN L. PATRICK, OF THE U. S. DEPARTMENT OF AGRICULTURE, AND J. F. STROUD, OF THE ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES.

W. EDWARD HEARN, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1916.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1918.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., December 24, 1917.

SIR: In the extension of the soil survey in the State of Alabama during the field season of 1916 a survey was undertaken in Monroe County. This work was done in cooperation with the Alabama Department of Agriculture and Industries, and the selection of the area was made after conference with State officials.

I have the honor to transmit herewith the manuscript report and map covering this work and to request their publication as advance sheets of Field Operations of the Bureau of Soils for 1916, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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SOIL SURVEY OF MONROE COUNTY, ALABAMA.

By HOWARD C. SMITH, In Charge, and AUSTIN L. PATRICK, of the U. S. Department of Agriculture, and J. F. STROUD, of the Alabama Department of Agriculture and Industries.—Area Inspected by W. EDWARD HEARN.

DESCRIPTION OF THE AREA.

Monroe County is in southwestern Alabama. (See fig. 1.) It is bounded on the north by Wilcox County, on the east by Butler and Conecuh Counties, on the south by Escambia and Baldwin Counties, and on the west by Clarke County. The included area is 1,012 square miles, or 647,680 acres.

Physiographically the county consists of the remnants of a southward sloping plain so thoroughly dissected that no part of the original surface is left intact. The wide range in the relief of the county is due wholly to local variations in the extent of this dissection.

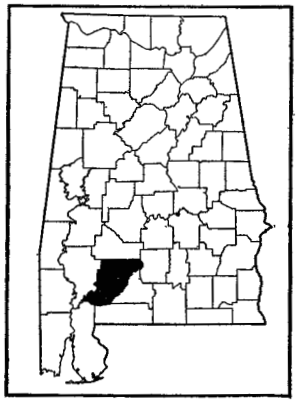

FIG. 1.—Sketch map showing location of the Monroe County area, Alabama.

The sketch map (fig. 2) on page 6 indicates the progress of erosion processes in various parts of the county, expressed in terms of the present topography. The map is shaded to show four kinds of relief. The first division comprises rough, broken uplands underlain by soft limestones or highly siliceous rocks, all easily eroded. This is almost entirely nonagricultural, wooded land. Elevations range from about 150 to 600 feet above sea level.

The second division consists of hilly to rolling uplands, moderately dissected by streams flowing through broad, deep valleys, having steep to precipitous bluffs and flood plains ranging from 1 to 2 miles in width. The valley floors have been cut to depths of 200 to 250 feet. Siliceous and calcareous rocks outcrop in the deeper valleys, and surface erosion is active. The elevation of the upland ranges from about 100 feet along the streams to a maximum of about 500 feet on the divides.

The third division includes flat or undulating to very gently rolling uplands, subject to some erosion. The stream valleys are one-eighth to one-half mile wide, and have steep to rolling slopes. Elevations range from 75 to 250 feet. A large proportion of the land is tillable.

The fourth division includes flat to gently sloping terraces and flood plains. The terraces were formed when the rivers flowed at higher levels than at present. The highest of these terraces are those upon which Tinela and Claiborne are situated, the range of elevation being from 190 to 225 feet above present low-water mark.[1] Erosion has largely destroyed the terrace characteristics, and they can definitely be identified only by careful study and by comparison of elevations. The soils on this terrace are classed with upland series. The third terrace in Packers Bend, in T. 9 N., R. 6 E., is undulating to flat, and

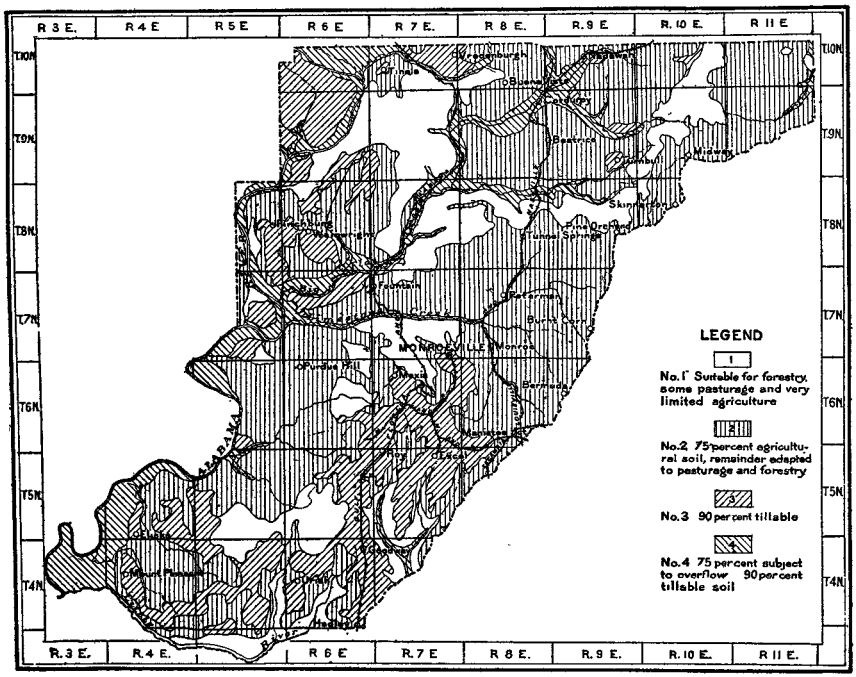

FIG. 2.—Sketch map showing topographic divisions of Monroe County.

is not everywhere readily distinguishable from true upland. The elevations vary from 100 to 160 feet above low-water mark.

The second terrace, lying from 40 to 90 feet above low-water mark, has a flat to undulating surface. Only the lower parts are overflowed at a 45-foot stage of the river at Selma.[2] The first bottoms vary in width from a few rods to 2 miles. Local differences of elevation of 25 feet occur.[3]

[1] For more detailed description see pp. 126 to 130, Geology of the Coastal Plain of Alabama, by Dr. E. A. Smith.

[2] The prediction of overflows from Selma is depended upon by cattlemen and planters, and there is usually ample time after a flood warning is given to remove stock and other property. A 45-foot stage is reached but a few times in a decade.

[3] The ordinary stages of 25 feet are sufficient to cover the lower first bottoms, which are normally inundated two or three times a year.

The lowest point in the county, with an elevation of about 50 feet, is where the Alabama River leaves the county; the highest elevation is on Lookout Hill 5 miles east of Tinela, in sec. 35, T. 10 N., R. 7 E. The following elevations have been determined by the Louisville & Nashville Railway Co.: McWilliams 405 feet above sea level, Nadawah 306 feet, Beatrice 351, Tunnel Springs 364, Peterman and Monroe Station 286, Manistee Junction 360, and the county line 488 feet. The following elevations are reported by the Gulf, Florida & Alabama Railway: Vredenburgh Junction 75 feet, Fountain 132, Jones Mills 405, and Hadley 363 feet. Midway, according to the U. S. Coast and Geodetic Survey, is 570 feet above sea level.

The solution of the White limestone and the subsequent settling of the surface has formed numerous lime sinks in the section from Monroeville to Perdue Hill and southward. These may be permanently wet, as Moores Pond, south of Perdue Hill in sec. 29., T. 6 N., R. 6 E.; intermittent, as the sink in sec. 13, T. 4 N., R. 6 E., near Goodway station; or dry, as that south of Homewood in sec. 30, T. 5 N., R. 5 E. The lime sinks vary in size from a fraction of an acre, too small to be mapped, to about 250 acres. They may be scattered about several miles apart, or may be so thick as to give the country a pitted appearance, as in the NW. ¼ sec. 28, and NE. ¼ sec. 29, T. 6 N., R. 6 E. Small streams in this part of the county often disappear for short distances, to reappear in a rocky canyon. The billowy or hummocky areas south of Monroeville in secs. 11 and 12, T. 6 N., R. 7 E., are typical of lime-sink topography.

With the exception of an area of about 70 square miles in the southeastern part, which is drained by the Escambia River system, the county is drained by the Alabama River and its tributaries. The drainage is through the Tallatchee, Big Flat, Limestone, Randons, and Lovetts Creeks, and Little River, all of which flow in a westerly direction through deep valleys.

Monroe County was organized in 1815. Prior to this time the territory was inhabited by Creek Indians, some of whose descendants still live in the southern part of the county. The earliest settlers were mainly of Scotch descent, with a considerable number of Irish and English parentage. They were mainly from the older settled southern States. In later years there has been no immigration from foreign countries or other States, and the descendants of the earlier settlers constitute the greater part of the present population.

The populaton has increased steadily from 17,091 in 1880 to 27,155 in 1910. Over half the inhabitants are colored. All the population is classed as rural, and averages 26.8 persons to the square mile. The greater part of the population is engaged in agriculture. Monroeville, the county seat, is the largest town, with a population of 616

in 1910. Beatrice has a population of about 350, and Jones Mills a population of about 450.

A regular line of steamboats plies between Mobile and Montgomery, and there are a large number of freight and passenger landings in the county.

Transportation facilities are afforded by the river and by two main-line and four subsidiary railroads. Excepting the extreme northeastern and southwestern sections, all parts of the county are within 10 miles of a railroad shipping point. Marked improvement has taken place in railroad facilities in the last 15 years, a condition that has not been shared by the water communication. About one-fifth of the county utilizes water transportation.

The county recently issued bonds for road improvement. Many of the main roads have been graded and surfaced with sand and clay or sand and gravel. The principal streams are bridged. There is an abundance of excellent road material in the county.

The larger towns are connected by telephone, and rural service is gradually extending. A system of graded schools, both for white and colored, and a county high school at Monroeville afford good educational facilities. Many sections have rural mail delivery service.

The principal products shipped out of the county are cotton, lumber, resin, turpentine, and beef cattle. Less important products are peanuts, velvet beans, peaches, pecans, eggs, poultry, and pure-bred hogs. The principal imported commodities, which could be advantageously produced within the county, are onions, Irish potatoes, lima beans, peanuts, flour, corn meal, rice, meat, and lard. Considerable hay, ground and mixed feeds, corn, and oats are annually shipped in. There are good local markets for home-raised food products. Cotton marketing is thoroughly systematized, but there is little system in the disposal of other products. There are three easily accessible seaport markets; New Orleans for beef cattle, and Mobile and Pensacola for lumber, turpentine, resin, and general produce. The main inland markets outside the county are Selma and Montgomery, where most of the cotton crop is sold.

CLIMATE.

Monroe County lies only about 60 miles north of the Gulf of Mexico, and the climate is that of the warm temperate zone. There is no Weather Bureau station in the county, but the records of the station at Evergreen, Conecuh County, are fairly representative of local climatic conditions. The mean annual temperature is about 65° F. The average temperature for April and October is also about 65° F. January, the coldest month, has an average tempera-

ture of about 48° F., and July and August, the hottest months, an average of about 80° F.

The active growing season begins late in March and continues till late in October. The average length of the growing season is 241 days, or about 8 months. The average date of the last killing frost in the spring is March 15, and that of the first in the fall, November 11. The latest killing frost in the spring recorded at the Evergreen station occurred April 26, and the earliest in the fall, October 21. Even in the shortest seasons there is ample time for the maturing of all the staple crops. The county has a range of elevation of 545 feet, and the season is on the average considerably shorter in the stream bottom lands than on the higher elevations.

During the winter the ground seldom remains frozen for an entire day. Thin ice usually forms several nights each year, and light frosts are of frequent occurrence from December to February, inclusive. Flurries of snow occur at rare intervals. The winters are normally so mild that roses and violets often bloom continuously. Plowing can be done at any time. Hardy vegetables such as lettuce, radishes, cabbage, collards, turnips, beets, onions, and spinach are grown in winter gardens, and rarely require protection. Vegetables such as Irish potatoes, English peas, and beans are planted in February, although a covering of cloth or pine straw may be needed on the coldest nights. Hardy sedges, rushes, and switch cane remain green and furnish a fair substitute for grass pasturage during the winter months. Winter pastures can be maintained, but the natural pasturage alone is not sufficient to keep stock in the best of condition. Cold, wet weather is very exhausting to stock. Cattle are generally not sheltered, and their condition in the spring depends in a large measure on the severity of the winter.

The mean annual rainfall is about 51 inches. The precipitation is normally adequate for crop production, and is generally well distributed throughout the year. Thunderstorms are of frequent occurrence in the warmer months and may occur at any season. Both general rains and thundershowers may be violent and precipitations of 5 or 6 inches in 24 hours are not uncommon. Such periods of excessive rainfall or of drought as may occur never cause a total loss of a crop, though they may result in much damage. Considerable rain falls from October to March, inclusive, when it is not needed by growing crops, and this usually floods the bottom lands several times each year. On the smaller creeks overflows are always of short duration, seldom lasting more than three to five days, but the Alabama River may overflow its banks for from one to five weeks at a time. Although these overflows usually occur when there are no crops on the land, farmers in such areas do not count on harvesting more than three full crops out of five.

Drainage throughout the greater part of the county is good or can readily be made so. Water for home and farm use is easily obtained. The ordinary wells are shallow, uncurbed excavations ranging in depth from 10 to 80 feet. The best and most sanitary type of well is bored and lined with vitrified tile. In the hilly regions of the county there are many springs which furnish good water for home and stock use.

The following table compiled from the records of the Weather Bureau station at Evergreen, Conecuh County, give the more important data relative to the climate of this part of the State:

Normal monthly, seasonal, and annual temperature and precipitation at Evergreen, Conecuh County.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute Minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1900).
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*
December	49.3	82	11	3.83	2.78	5.16
January	47.9	82	13	3.99	4.05	3.00
February	50.3	84	0	6.04	6.69	13.51
Winter	49.2	84	0	13.86	13.52	21.67
March	57.9	87	23	5.29	4.33	7.07
April	65.3	92	29	3.33	1.82	5.40
May	72.7	103	42	3.52	2.43	1.75
Spring	65.3	103	23	12.14	8.58	14.22
June	78.6	106	50	5.43	2.13	10.75
July	80.5	105	56	6.24	3.40	4.54
August	80.2	102	59	4.88	6.14	1.60
Summer	79.8	106	50	16.55	11.67	16.89
September	76.3	102	40	3.51	.05	6.89
October	65.0	101	28	2.00	T.	5.40
November	56.5	90	20	3.17	1.57	2.51
Fall	65.9	102	20	8.68	1.62	14.80
Year	65.0	106	0	51.23	35.39	67.58

AGRICULTURE.

The agriculture of the early settlers in Monroe County was largely of the self-sustaining type. The bottoms and sandy hammocks of Big Flat Creek were cleared first, and prior to the Civil War the agriculture of the northern part of the county was centered about these areas. The owners of these large tracts usually lived on the hills and cleared small areas of upland soil. The "hill lands" in the northern

third of the county were considered more desirable than the "piney-woods" areas to the south; the "flat lands" from Jones Mills southward were not thought worth settling. The hill lands in the northern part are now largely devoted to cattle raising, and support a sparse population. The flat lands are inhabited largely by farmers from the northern sections, and have greatly increased in value in the last 15 or 20 years, while the value of the hill lands has decreased.

The early agriculture was very wasteful. The soil was allowed to gully and wash to such an extent that in many cases it was necessary to abandon the farms, the farmers moving to the southern parts of the county. Success was made possible only by an unlimited acreage of cheap lands high in natural productiveness, cheap labor, and the low cost of living due to the home production of food and clothing. Farming consisted mainly of the production of a small acreage of cotton and a large area of corn, with some oats and wheat. Occasionally large yields were made, but the average yields were much lower than those that have prevailed during the last 20 years. Cattle, hogs, and sheep were raised. Turpentining and lumbering were important industries and even up to the present time the clearing of the land has more than kept pace with its utilization for agriculture.

Since the Civil War agricultural progress has been steady. The population has gradually increased and farming has largely displaced turpentining and lumbering. Cotton and corn have continued the two most important crops, cotton being the chief source of revenue and corn being grown for feeding stock and for making corn meal for home use. The following table, compiled from the census reports of 1880, 1890, 1900, and 1910, indicates the general trend of crop production:

Acreage and production of principal crops in Monroe County for the census years 1880 to 1910, inclusive.

Year.	Cotton.		Corn.		Oats.		Hay and forage.		Dry peas.		Peanuts.	
	Acres.	*Bales.*	*Acres.*	*Bush.*	*Acres.*	*Bush.*	*Acres.*	*Tons.*	*Acres.*	*Bush.*	*Acres.*	*Bush.*
1880.....	33,463	10,421	24,135	251,068	4,597	44,024	1	1	.....	3,264	.....	.....
1890.....	41,782	15,919	26,715	351,725	4,704	41,942	127	103	.....	5,536	380	6,083
1900.....	43,443	17,101	37,752	482,655	3,831	37,940	602	605	4,043	37,259	656	7,766
1910.....	65,954	21,358	35,316	385,276	3,101	37,882	2,607	2,571	2,138	10,385	1,539	17,463

In the decade from 1900 to 1910 the acreage of cotton showed a great increase, while the corn acreage was somewhat reduced. After the advent of the boll weevil, about 1913, however, the cotton yield was much reduced and corn became the most important crop of the county. Under present conditions it is difficult to give the yield of cotton, but it is believed that the yield in 1915 averaged about two bales to "the plow," or one bale for an area of 5 to 8 acres, and

in 1916 about one bale to the plow. In very recent years cotton has been grown at a loss, and future yields depend on the control of the boll weevil by destroying the insect, growing early maturing varieties, and proper management of the soil.

Improved varieties of both cotton and corn are being introduced, but little attention is paid to maintaining pure seed, with the result that the strains soon become impure as a rule, and nondescript mixed varieties prevail. Owing to the great losses caused by blight the Sam Wood's Blightless and other resistant varieties of cotton are grown to an increasing extent. The Blightless is believed to do better on run-down soils than the big-boll varieties, which succeed better on richer soils that are not blight infested. The varieties of corn generally grown are the Hastings Prolific and Tennessee Redcob, with some Hickory King and Marlboro. In addition to the corn produced in the county, it is estimated that over 100,000 bushels of corn and corn products are annually imported.

Fall-sown oats are grown almost exclusively, but a small area is devoted to winter-sown oats on the flat or poorly drained soils. It is difficult to determine the yield of oats, as little of the crop is thrashed and measured. Several well-cultivated fields in 1916 produced 30 to 40 bushels per acre. The Texas Red Rustproof and Hastings are common varieties, with some Appler and Bancroft. The acreage is increasing, and on many farms oats are well established in the rotations.

Peanuts are grown in small patches on nearly every farm. They are grown mainly in the corn fields, as fall pasturage for hogs or for hay. A small part of the crop is sold. About $80 per ton was received in 1916. The yield is reported to be from 10 to 15 bushels per acre, although more than double that yield is obtained on the sandy uplands. The Virginia Running, Virginia Bunch, and Spanish are the main varieties. The lack of modern implements and good market facilities has retarded peanut growing, but the tendency is toward a largely increased acreage.

Cowpeas are grown between rows of corn and sometimes with cotton, mainly for home use. The prevalence of cotton blight renders the sowing of the Iron and Brabham varieties necessary in infested areas. Soy beans are not generally grown.

Velvet beans were introduced in 1914, and they are now grown on nearly every farm in the southern two-thirds of the county. They are planted in April between rows of corn, and harvested in October for seed or pastured until January. They yield about 1 ton of beans in the pod per acre, the vines remaining for pasturage. Velvet beans do well on run-down soils. The beans sell for $10 to $20 per ton. A mixture of ground corn and velvet beans has proved a valuable concentrate, used with ensilage, for fattening cattle.

The production of hay, while not yet sufficient to meet the local requirements, is annually increasing in importance. The hay consists mainly of crab grass and crowfoot grass, with some Mexican clover. Lespedeza, carpet grass, Bermuda grass, Johnson grass, and broom sedge are grown in small areas on the lower lying soils. Cat-tail millet is grown to a small extent as a supplementary green feed for work stock and cows.

Sugar cane and, to some extent, sorghum are grown on practically every farm to be made into sirup for home use. Yields of 100 to 200 gallons per acre are common, and much larger quantities are often obtained. Sorghum, sown thick, is also used as forage.

The 1910 census reports 1,437 acres in sweet potatoes, with a production of 115,709 bushels, and a total of 919 acres in other vegetables. Attempts have been made to grow sweet potatoes commercially, and the yields have been very encouraging, but better marketing facilities are needed. A wide variety of vegetables, including collards, cabbage, turnips, English peas, rutabagas, mustard, radishes, tomatoes, and Irish potatoes, are grown, usually in sufficient quantity to meet home requirements. Chufas do well, especially in the southern part of the county, where they are a common crop for hog pastures. Upland rice is produced in the southern half of the county, the flat lands and lime-sink soils being well suited to its culture.

The 1910 census reports a total of 27,230 peach trees and 2,635 apple trees in the county. Peaches do well and are grown commercially in a few cases, but there is a need for organized marketing facilities. Some pears are grown in small orchards. Some strawberries, figs, Japanese persimmons, and scuppernong grapes are produced for home use.

During the last decade pecans have steadily increased in importance. The census of 1910 reports 1,005 trees in the county, and the number is now much greater. Seedling pecans have been grown successfully on the well-drained soils for the last 50 years. Only budded stock is now grown, the Stuart and Van Deman being the leading varieties.

In 1909 there were over $211,000 worth of live stock sold or slaughtered on farms. The number consisted of 269 calves, 5,089 head of other cattle, 285 horses or mules, 11,195 hogs, and 223 head of sheep. The 1910 census reports 6,599 dairy cows on farms reporting dairy products. The number of dairy cows has greatly increased during the last five years.

Cattle raising became an important industry in the northern part of the county about the time a large number of the settlers removed from that section, leaving large areas of cheap lands. The development of this industry has been retarded by the cattle tick, although

in many places north of Monroeville the cattle are dipped regularly and the tick is largely kept under control. A number of pure-bred sires have been imported and a general effort is being made to improve the common range stock.

Since the 1910 census was taken there has been a considerable increase in the number of hogs in the county, but the pork products are not yet sufficient to meet the local demand. The inferior razor-back hogs are largely being displaced by animals of the Hampshire, Duroc-Jersey, and Berkshire breeds, and with the increasing acreage of feed crops hog raising is proving profitable.

Very few horses or mules are raised, the work stock consisting largely of animals imported from northern States. Oxen are used by some tenants and in lumbering.

Some sheep are raised in the county. Dairying has increased considerably in importance in recent years.

The relative value of farm products, as reported in the 1910 census, is given in the following table:

Product.	Value.	Product.	Value.
Cereals	$406,958	Live stock and products:	
Other grains and seeds	36,094	Animals sold or slaughtered	$211,481
Hay and forage	35,293	Dairy products, excluding home use.	64,367
Vegetables	156,452	Poultry and eggs	86,925
Fruits and nuts	16,712	Wool, mohair, and goat hair	182
All other crops (mainly cotton)	1,875,465	Total value	2,889,929

The farmers generally recognize the broad adaptation of the various soils to particular crops. The presence of the boll weevil has resulted in a distinct recognition of the suitability of certain types for early-cotton production. Nearly all the soils of the first bottoms, much of those on the second bottoms, and all of the undrained upland types mature cotton late. The gravelly types are known to give much more profitable yields of cotton than of any other crop. It is recognized that certain strains of cotton, such as the Blightless, do proportionately better on impoverished soils than the larger-boll varieties, but there is a general need for study and care in breeding the strain of cotton to suit the requirements of the soil type. A strain of cotton carefully developed on the Susquehanna clay for several years probably will become adapted to that type in much greater degree than some variety transferred to it from the Orangeburg gravelly sandy loam. The heavier areas of the sandy loams and clays are considered better for winter oats than the lighter sands. Undrained soils are not thought well suited to winter oats, but spring oats may succeed. The Grady clay loam is adapted to the production of upland rice. Selected small areas of Meadow,

Ochlockonee fine sandy loam, and small patches consisting largely of colluvial material, as well as some of the Kalmia fine sandy loam, are known to produce the heaviest yields of cane, as well as sirup of the best flavor and most desirable color.

Cultivation is usually shallow, the 1-mule scooter plow being in general use. The same plow with different blades may be used for all the farm tillage. A few farmers flat-break the land, and later bed it. There are two or three tractors in use in the county, and the results from deeper plowing are very satisfactory. Fall and winter plowing is seldom practiced, but where it has been tried on heavy clay soils it has proved profitable.

The farm dwellings are usually unpainted frame structures. Many of the colored tenants occupy log cabins. The barns are small, but usually large enough to house the work stock and store ear corn, the remainder of the forage being stacked nearby. Many of the poorer tenants use either a single or double ox team; in many cases their entire farm equipment, inclusive of household furniture, does not exceed $150 in value. On farms occupied and operated by the owners drills, planters, two-horse turning plows, binders, harrows, and different types of cultivators are in common use. The sandy soils do not require as heavy equipment as the clays. In general, however, the work stock and tools are too light for proper tillage.

No systematic rotation of crops is practiced. Many farmers alternate cotton with corn. On the bottom lands corn and hay are commonly alternated. Cowpeas, velvet beans, and peanuts are often grown with corn.

Oats are seeded in October or in January; Irish potatoes and corn in March; and velvet beans, cotton, and some of the cowpeas and peanuts in April. Oats and Irish potatoes are harvested in May or June; corn, hay, and cowpeas in September or October, and cotton, velvet beans, and sweet potatoes in October.

The census reports a total expenditure of $171,547 for fertilizers in 1909, an average of $49.51 for each of the 3,465 farms reporting their use. Owing to the recent scarcity of potash and the high price of certain other ingredients, less complete fertilizer is used than formerly, more dependence being placed on manure and leguminous green-manure crops. Home-mixed fertilizers are used by a few farmers, and these consist largely of cottonseed meal and acid phosphate. Contrary to the general opinion of farmers, the soils are not high in lime. All the clayey upland soils as well as the sandy soils are in need of lime. Outcrops of limestone occur throughout the county, affording a convenient source of supply.

The farm labor in the northern part of the county consists chiefly of negroes. On the flat lands of the southern part white laborers predominate. Farm laborers receive $10 to $14 a month, usually

with rations. Men employed by the day receive 60 cents to $1. Negro women employed in the fields receive 40 to 60 cents a day. Cotton pickers receive 50 cents to 75 cents per hundred pounds, and velvet-bean pickers 20 cents per hundred pounds. The census reports a total expenditure of $147,022 for labor in 1909, on 1,689 farms, or over one-third of the total number in the county, reporting the use of hired labor.

The size of the farms[1] varies from about 40 acres in the southern part of the county to about 640 acres in the hill regions. The 1910 census reports a total of 4,613 farms in the county, averaging about 95 acres in size. About 68 per cent of the area of the county is in farms, and 37.5 per cent of the farm land, or an average of about 36 acres per farm, is improved. Large tracts of timber, turpentine, and cut-over land are owned by companies. There are some individual holdings of 5,000 to 15,000 acres, and individual ownership of tracts ranging from one-half section to several sections is common. In the regions about Jones Mills, Excel, Megargel, and Jeddo, holdings range from 50 to 125 acres. The tendency is toward smaller farms.

Since 1890 the percentage of farms operated by owners has steadily decreased. The 1910 census reports 39 per cent of the farms operated by the owners, and practically all the remainder by tenants. There are several systems of leasing land, all based upon cotton production. At present a general change in the methods of renting farm land is taking place. Under one system commonly practised the owner receives one and one-half to two bales of cotton for a "one-mule" farm of 25 to 30 acres. Under another the owner furnishes the work stock, seed, tools, and one-half the fertilizer, pays one-half the cost of baling, and receives one-half the cotton and corn produced. Cash rent varies widely, depending on the location and character of the soil. Ordinarily a "one-horse" farm rents for $50 to $100. The supplies of the renters are usually advanced by the landowner or by a merchant or bank.

Land values have a wide range, due in large measure to differences in topography. In the roughest sections the average price is $1.50 or $2 an acre; in the rolling to hilly areas and on the terraces land is valued at about $5 to $15, and in the flat areas at $30 to $50. The value of farm land also depends on improvements, location with respect to towns and transportation facilities, drainage, and other factors. The best lands in the flat areas sell for $100 an acre, while cut-over lands in the rolling sections sell for about $5 an acre. The average assessed value of farm land is given in the census of 1910 as $7.55 an acre.

[1] Each tenancy is classed as a farm.

SOILS.

Monroe County lies entirely within the Gulf Coastal Plain and the soils are mainly upland types derived from unconsolidated or weakly consolidated deposits of sand, clay, and calcareous material. Classified broadly according to origin of the soil material, the soils fall into five main divisions: (1) Upland soils derived from lime-bearing rocks; (2) upland soils from noncalcareous siliceous rocks; (3) upland soils derived from unconsolidated deposits of sand, clay, and gravel; (4) terrace soils derived from old alluvium and largely above ordinary overflow; and (5) flood-plain soils overflowed several times annually and still in process of formation and change.

It is often impossible to trace the origin of any given type to any definite geological horizon.[1] In the northern part of the county the Bell Landing formation gives rise to the extensive areas of Susquehanna soils, and mingled with this in such a manner as to be almost undistinguishable are the Woods Bluff and Hatchetigbee formations. The Clairborne and White limestone formations outcrop frequently in the southern half of the county, although they give rise to little soil. The Clairborne occurs in the Limestone Creek region, and the White limestone predominates south of Monroeville. These formations have a marked influence on the topography. Lime sinks are numerous not only where the rocks lie within a few feet of the surface, but also where they occur at depths of 200 feet or more.

The Buhrstone is the most generally recognized formation in the county. It consists of whitish to grayish siliceous rock closely resembling limestone, but contrary to general belief containing no lime. The various strata of the Buhrstone formation are of such unequal degrees of hardness and erode so unequally that the surface in areas where it occurs appears as a region of mountains in miniature. The formation occurs in the northern half of the county, where it gives rise to the Lauderdale stony clay and a small proportion of the Susquehanna soils.

The Grand Gulf formation occurs in the southern fourth of the county. This formation consists of unconsolidated sands, clays, and fine sandy clays occurring in strata of many different colors and occasionally feebly consolidated.[2] The area of soil derived from this formation is rather uncertain, but apparently all the Plummer fine sandy loam much of the Grady clay loam, and a considerable part of the flat areas of the Orangeburg, Norfolk, and Greenville fine sandy loams is either derived from or very markedly influenced by it.

Overlying the highest hills of the county is the patchy remnant of a mantle of unconsolidated sands, sandy clays, and sandy loams that

[1] Statements regarding geology from Geology of the Coastal Plain of Alabama, by Dr. E. A. Smith.
[2] Loc. cit., pp. 97 to 107.

once was continuous over the region. This formation gives rise to the greater part of the typical Norfolk, Ruston, Orangeburg, and Greenville soils and small parts of the Susquehanna soils.

Physiographically, the rough, nonagricultural Guin stony sandy loam and Lauderdale stony clay and the rough Orangeburg and Ruston gravelly sandy loams are in striking contrast to the prairielike, smooth areas of the other Orangeburg types and the types of the Greenville and Norfolk series. In the same degree the gray to bluish, heavy, water-logged Bibb and Grady soils are strikingly different from the reddish, droughty, coarse-textured Ruston gravelly sand. With the exception of the clay types, every soil has a sand content ranging from 10 per cent up to 95 per cent. The prevailing color of the surface soils is light gray and of the subsoils red, with some yellow and mottling in places.

According to the classification adopted by the Bureau of Soils, soils that are similar in color, origin, formation, structure, and general topography and drainage are grouped in a series. The series is divided on the basis of texture into soil types. Seventeen series, comprising twenty-seven types, exclusive of Meadow, a miscellaneous type, are mapped in Monroe County. The upland soils are classed with the Greenville, Susquehanna, Orangeburg, Norfolk, Lauderdale, Ruston, Guin, Grady, and Plummer series. The terrace or second-bottom soils are included with the Chattahoochee, Cahaba, Kalmia, Leaf, and Myatt series, and the first-bottom soils with the Bibb, Ochlockonee, and Congaree series.

The Greenville soils are distinguished from the closely related Orangeburg by their brownish to reddish soils and deep-red clay to fine sandy clay subsoil. The fine sandy loam is the only member of this series recognized in Monroe County.

The Susquehanna soils range from gray to brown or reddish in the surface section, with red, plastic clay subsoils, which are mottled with yellow and gray at depths of less than 3 feet. The series in the county is derived largely from the dark-colored clayey Tertiary deposits. A moderate degree of weathering is indicated by the red or mottled color of the subsoils. The Susquehanna fine sandy loam, very fine sandy loam, and clay are mapped in this county.

The soils of the Orangeburg series have light-gray to grayish-brown soils, and a red, friable sandy clay subsoil. The fine sandy loam and gravelly sandy loam types are mapped in this county. They are well drained. The surface ranges from rolling to flat.

The types included in the Norfolk series have light-gray to gray surface soils, and a yellow fine sand to fine sandy clay subsoil. These soils are derived from the highest unconsolidated deposits of sand and clay. Two types, the fine sand and fine sandy loam, are mapped.

The Lauderdale series is represented by a single member, the stony clay. The surface soil is gray and the subsoil reddish. This is a rocky, nonagricultural type.

The Ruston soils have gray to brownish-gray surface soils and reddish-yellow to yellowish-brown, friable sandy clay subsoils. In color the subsoil is intermediate between the yellow Norfolk and the red Orangeburg. The Ruston gravelly sand, gravelly sandy loam, and fine sandy loam are mapped.

The Guin series is represented by the stony sandy loam, a rough, nonagricultural type which consists of an intricate admixture of material from upland types of the county, mainly Orangeburg, Susquehanna, Norfolk, Greenville, Ruston, and Lauderdale.

The lime sinks scattered over the southern half of the county are occupied by the Grady clay loam. This type has a gray surface soil and a mottled gray, drab, yellow, and red, plastic clay subsoil.

The Plummer series is represented by the fine sandy loam. The surface soil is ashy gray, and the subsoil is a light-gray or mottled gray and yellow sandy clay. This soil occupies seepy areas.

There are relatively extensive areas of terrace soils in the county, along both the river and the larger creeks. They consist principally of reworked and redeposited Coastal Plain material. As a rule the terrace soils along the river differ from those along the larger creeks in being better drained and more eroded, owing to their greater age, and also in lying at greater elevations. The percentage of mica is always greater in the river-deposited material, and the mineralogical composition has a wider range. With the exception of the Chattahoochee fine sandy loam, all the terrace soils are in part flooded during extremely high water, though as a rule they lie well above ordinary overflow.

The Chattahoochee series is represented by a single type, the fine sandy loam. It is a counterpart of the upland Orangeburg fine sandy loam. In topography it resembles the flat phase of the Orangeburg fine sandy loam. The Chattahoochee fine sandy loam is the best drained of the terrace soils. It occurs only on the higher parts of the Alabama River terrace.

The Cahaba soils closely resemble the upland Ruston soils in color and texture. The soils are gray to brownish, and the subsoil reddish yellow. The fine sandy loam and silt loam types are mapped.

The Kalmia series is represented by a single type, the fine sandy loam. This soil closely resembles the upland Norfolk fine sandy loam.

The Leaf series includes two types in this county, the fine sandy loam and silt loam. The former closely resembles the upland Susquehanna fine sandy loam. It has a level topography and is in part flooded during high water. Drainage is not well developed, and the plastic clay of the lower subsoil is mottled.

The Myatt series is distinguished from the closely related Kalmia by the darker color of the surface soils and the more mottled and

heavier structure of the subsoil. Only one member of this series, the fine sandy loam, is mapped in Monroe County. In many respects this soil resembles the Plummer and Grady soils of the upland.

The Bibb, Ochlockonee, and Congaree series include the flood-plain soils. These soils are subject to frequent overflows, and the surface is constantly being changed. The additions of new material range from a deep deposit of unproductive sand to thin layers of productive silt and clay.

The Bibb series is represented by one type, the clay loam. This is a white or light-gray soil underlain by a light-gray or whitish, compact subsoil.

The types in the Ochlockonee series have brown surface soils and a brown or mottled gray and drab subsoil. The fine sandy loam and clay loam types are mapped. The clay loam is quite uniform, but the fine sandy loam is somewhat variable in color and texture.

The extensive first-bottom soils of the river are classed with the Congaree series, which in this county includes the fine sand and the silty clay loam. The fine sand has a characteristic gray color and contains much finely divided muscovite mica. The silty clay loam has a reddish to brownish soil and a brownish subsoil. These soils are composed mainly of reworked Piedmont material deposited by the Alabama River.

Areas of the flood plains in which the material is so variable and mixed that it can not be classified into separate types are mapped as Meadow.

The following table shows the actual and relative extent of the various soil types of Monroe County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Orangeburg fine sandy loam	42,496	10.1	Lauderdale stony clay	20,352	3.1
Flat phase	22,848		Ochlockonee fine sandy loam	19,136	3.0
Ruston gravelly sandy loam	60,480	9.3	Ochlockonee clay loam	13,760	2.1
Susquehanna clay	36,416	9.2	Kalmia fine sandy loam	11,840	1.8
Hilly phase	23,232		Leaf fine sandy loam	10,624	1.6
Norfolk fine sandy loam	24,768	8.4	Ruston gravelly sand	8,768	1.4
Flat phase	24,384		Bibb clay loam	7,552	1.2
Poorly drained phase	5,952		Cahaba fine sandy loam	6,976	1.1
Norfolk fine sand	41,152	6.4	Plummer fine sandy loam	5,696	.9
Orangeburg gravelly sandy loam	38,976	6.0	Myatt fine sandy loam	4,352	.7
Greenville fine sandy loam	24,512	5.9	Cahaba silt loam	3,008	.5
Flat phase	13,696		Congaree fine sand	2,880	.4
Ruston fine sandy loam	37,120	5.7	Chattahoochee fine sandy loam	2,880	.4
Meadow	32,832	5.1	Leaf silt loam	2,304	.4
Guin stony sandy loam	27,072	4.2	Grady clay loam	192	.1
Susquehanna fine sandy loam	25,472	3.9	Total	647,680	.....
Congaree silty clay loam	24,768	3.8			
Susquehanna very fine sandy loam	21,184	3.3			

GREENVILLE FINE SANDY LOAM.

The Greenville fine sandy loam, to a depth of about 6 inches, is a reddish-brown or dull-red, mellow fine sandy loam, containing in places many hard, polished black iron concretions about the size of a pea. The subsoil is a red, heavy compact but friable fine sandy clay to clay loam. At depths of 5 to 8 feet the material is lighter red or reddish yellow, and frequently at greater depths a stratum of gravel, varying in thickness from 8 to 15 feet, is encountered. This often gives rise to gravel on the hill slopes. The type is subject to some variation, usually correlated with difference of topography and degree of erosion.

With the exceptions of Tps. 8, 9 and 10, N., Rs. 7 and 8 E., lying to the west of Beatrice and north of Scotland, this soil is encountered in every township in the county. A typical area is mapped in secs. 10 and 11, T. 7 N., R. 7 E., along the ridge road from Axle to Franklin. The type occurs on broad, flat-topped divides, on moderate slopes, and on the crests of rounded hills which are partially eroded. It does not occupy quite so high a position as the Norfolk and Orangeburg soils. Erosion is active, and the type in many cases appears to be derived by erosion from the Orangeburg fine sandy loam. In many places erosion has proceeded to such a degree that it is difficult to establish a boundary between the two series, and the type includes patches of Orangeburg and Susquehanna soil. The surface drainage is excessive, and the underdrainage good.

The Greenville fine sandy loam is one of the most extensive and important soils in the county. About three-fourths of the type is under cultivation, the rest being in native forest, consisting of oak, hickory, dogwood, cucumber tree, shortleaf pine, and some longleaf pine. Cotton, formerly the leading crop, occupies an acreage about equal to that of corn and cowpeas. Velvet beans, sweet potatoes, cowpea hay, and oats, with some sorghum and sugar cane and a little hay, are grown as subsistence crops.

Corn yields 12 to 15 bushels per acre. The yields of other crops are generally somewhat higher than on the Norfolk, Ruston, and Orangeburg soils. Low-grade fertilizers are, when available, commonly used on these crops.

The type is very susceptible to erosion. Even where considerable care is taken to protect the land there is a constant loss of surface soil, and some of the subsoil is annually plowed up to replace the lost material.

Land of this type sells for $10 to $30 an acre, the higher prices prevailing near the towns.

The comparatively high yields obtained on this type, notwithstanding the generally low organic-matter content of the soil and the annual loss of valuable soil through erosion, are evidence of its

inherent high productiveness. With deeper plowing, the growing of green-manure crops, and the use of lime, yields may be greatly increased. Winter cover crops should be grown. Winter oats are very successful for this purpose.

Greenville fine sandy loam, flat phase.—The soil of the flat phase is darker brown and slightly shallower than that of the typical Greenville fine sandy loam. The upper subsoil is a very dark red to brownish-red, compact, brittle, heavy, fine sandy clay to clay. Below about 2 feet the color is lighter red, and at about 36 inches red and yellow mottling is often encountered, especially near the depressed areas of the Grady silt loam.

This phase is mapped south of Monroeville, where it occurs in rather large, flat bodies and many smaller areas. A typical area occurs on the low, broad, flat divide in Tps. 4 and 5 N., Rs. 6 and 7 E., extending from Roy southward to the county line. Owing to the smooth surface, the drainage is slow. There is no erosion, and vegetable matter tends to accumulate, giving the soil its dark color. Water often remains on the surface for a few days after heavy rains in the flatter areas. The subsoil is very retentive of moisture. Artificial drainage through ditching would be beneficial in some of the flatter areas and depressions.

About 95 per cent of the phase is tillable, and about 75 per cent is under cultivation. The uncleared area supports a forest of longleaf and shortleaf pine, oak, and hickory.

This is one of the important soils of the county. The farms on it are usually small, and the farming practices comparatively intensive. Corn, cotton, and velvet beans are the chief crops. Cowpeas, hay, oats, and sugar cane are grown as subsistence crops. Where the season is not too wet cotton does well. Corn yields 20 to 30 bushels per acre. Oat yields are estimated at 20 to 30 bushels per acre. Sugar cane produces about 200 gallons of sirup per acre. In the moist depressions upland rice is grown for home use, and produces good yields. Cattle and hogs are pastured on rougher soils and fattened on beans, peanuts, or velvet beans grown on this type. The live-stock industry is increasing in importance. Several cement silos have been constructed on farms on this soil. There seems to be no difficulty in producing ensilage equal to that of more northern regions. Small quantities of fertilizers are used. The organic-matter supply of the soil is easily maintained.

This soil sells for $50 to $100 an acre.

Owing to the satisfactory yields obtained on this soil, which are high as compared with those obtained on the eroded types, it is commonly supposed that the land is producing maximum crops, but if modern methods were employed materially increased yields might be obtained. Deeper plowing is needed, and liming would be beneficial.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the typical Greenville fine sandy loam:

Mechanical analyses of Greenville fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
415301	Soil	2.2	10.6	9.9	27.2	12.0	27.7	10.6
415302	Subsoil	.8	7.1	7.2	21.9	10.4	23.2	29.3

SUSQUEHANNA FINE SANDY LOAM.

The surface soil of the Susquehanna fine sandy loam is a light-gray loamy fine sand to light fine sandy loam, changing at a depth of about 5 inches to a yellowish, fine sandy loam. The subsoil, which is reached at a depth of about 10 inches, consists of a stratum of red, tough fine sandy clay, 5 inches thick, underlain by a red, plastic, sticky, puttylike clay, extending to 2 feet, changing at this point to a mottled red, gray, and yellow plastic clay.

There are numerous minor differences in the type as mapped. The surface soil does not differ greatly from that of the Ruston or Orangeburg series, and boring is often necessary to differentiate these series. Where the type is derived from the Buhrstone formation, stones often occur in both soil and subsoil. In areas contiguous to the gravelly types of the Orangeburg or Ruston series, or where gravel has accumulated on the slopes, the type includes patches of the Susquehanna gravelly sandy loam. Owing to the erosion which has taken place, the depth of soil and subsoil is subject to considerable variation. With the continuance of erosion many areas of fine sandy loam become clay, and part of the present Susquehanna clay type was formerly fine sandy loam.

The Susquehanna fine sandy loam occurs mainly in the northern half of the county and east of the Alabama River. The surface ranges from hilly and broken to rolling, although the type is not prevailingly as rough as the clay. The roughest areas are those near the branch heads and streams. Drainage is well developed and in many cases excessive. The movement of air and moisture through the subsoil is slow.

This type ranks higher than the Susquehanna clay in agricultural value because of its more favorable topography, nearness to markets, and greater ease of tillage. Less than 50 per cent is under cultivation. The present forest growth comprises old-field pine, shortleaf pine, several species of oaks, and gum, with a scattering of persimmon, chestnut, chinquapin, and longleaf pine.

Corn, cotton, and velvet beans are the main crops, followed by millet, sorghum, sugar cane, peanuts, cowpeas, sweet potatoes,

watermelons, and oats. The acreage of all crops apparently is increasing. Hogs are raised for home use, and to some extent for sale. Cattle raising is growing in importance, although the development of the industry is retarded by the prevalence of the fever tick. Crop yields are relatively low where the type is not kept in good physical condition. Corn averages about 10 bushels per acre and hay about 1 ton per acre.

The shallow plowing commonly practiced in the county prevails on this type. Commercial fertilizers are not used so extensively as on other types, largely because of the distance from shipping points. Recourse is had to legumes and manure, but this is supplemented in some cases with small quantities of low-grade commercial mixtures.

This type sells for $5 to $10 an acre, depending on distance to market, topography, and improvements.

Since the type was cleared erosion has ruined many valuable tracts and decreased yields on the type generally, and the first requisite in the improvement of this soil is protection from washing. This type requires the same treatment as the Susquehanna clay. It is considered best to till only the flatter areas, and to use the rest as pasture or forest land. Where the organic matter is increased, liming is advantageous.

SUSQUEHANNA VERY FINE SANDY LOAM.

The surface soil of the Susquehanna very fine sandy loam consists of about 5 inches of gray, floury or mealy very fine sandy loam, passing into a yellowish very fine sandy loam, extending to a depth of 8 to 10 inches. The upper subsoil is a red to reddish-yellow fine sandy clay. This is generally underlain at depths of 15 to 20 inches by a mottled red, gray, and yellow clay, moderately plastic to tough, except in the lower part of the 3-foot section, where it may become more friable.

The principal variations in this type are in the depth of the surface soil. This is due to erosion, which in extreme cases, as on steep slopes, has exposed the subsoil. In the areas of deeper soil, occurring in more nearly level areas, the sand soil may have a depth of 2 feet. In secs. 25 and 36, T. 10 N., R. 8 E., between Corduroy and Chestnut, the subsoil departs from the typical and resembles a mixture of the typical subsoil and that of the Ruston fine sandy loam.

Nearly all the type occurs within a radius of about 6 miles of Beatrice. The surface ranges from rolling to moderately rolling, this being the smoothest type of the Susquehanna series. Most of the type lies to the east of Beatrice, between Flat and Big Flat Creeks, where the watershed is narrow, but the surface is not hilly except on the slopes along the larger streams. The elevation of the type ranges from 300 to over 450 feet. The surface drainage is good.

Although the type has the smallest total area of any member of the series, it is the most valuable. The population is as dense as on any type in the county, and the soil is in a relatively high state of cultivation. Nearly one-third of the type is cultivated. On the remainder there is a forest growth of shortleaf pine and oak, with some longleaf pine, gum, persimmon, dogwood, and a scattering of chinquapin.

Corn, the chief crop, ordinarily yields 10 to 25 bushels per acre. Cotton does well even under boll-weevil conditions. The minor crops are the same as on the Susquehanna fine sandy loam, although they are grown on a proportionately larger acreage, and the yields are usually higher. The farms are much smaller, are more intensively tilled, and farming is more diversified. These conditions are due in part to the location of the type.

Land values range from $10 an acre upward, the higher values prevailing in the vicinity of Beatrice.

For its improvement this type requires about the same treatment as the Susquehanna fine sandy loam, with local modifications to suit the nature of the soil and the intensive methods of cultivation.

SUSQUEHANNA CLAY.

The Susquehanna clay, to a depth of about 6 inches, is a grayish to brownish, compact clay, rather friable when dry and very sticky and plastic when wet. On slopes the soil, where there is any, is reddish and very shallow. On flat divides and in forests there is often a thin veneer of fine sand, sufficient to impart a loamy texture to the soil. "New ground" usually is loamy and dark colored, owing to a plentiful supply of forest mold. At 6 to 12 inches the subsoil is a red or dark-red, clay, tough, sticky, and plastic. At lower depths the red becomes lighter and then yellowish, and at about 3 feet the material is a mottled gray, yellow, and red. In the lower lying areas and on slopes, rusty-brown, mottled gray and bluish-gray colors prevail.

This type occurs principally in a belt approximately 12 miles wide extending from the Conecuh-Butler County line on the east almost to the Alabama River on the west. South of this belt only a few detached areas are encountered. The type occupies nearly as high positions as the Norfolk, Orangeburg, and Greenville soils, the range in elevation being from 200 to slightly over 500 feet above sea level Much of the type forms long, winding ridges between the intermittent streams. The valley sides are moderately to steeply sloping. The land bordering branch heads is too steep for tillage.

The run-off is rapid and drainage is good to excessive. This type probably absorbs moisture more slowly than any other upland soil in the county. The movement of air and moisture through the lower subsoil is very slow.

The Susquehanna clay is an extensive and important type. At one time nearly one-half the type was tilled, but with the extension of erosion the area in cultivation has been greatly reduced. Fields recently abandoned support a growth of lespedeza and broom sedge, with carpet grass on the moist slopes. Reforested areas are covered with old-field pine, sweet gum, and sassafras. The original forest consisted of a good growth of oak and hickory, with several species of pine and some beech, persimmon, dogwood, broad-leafed magnolia, and gum.

The crops grown are corn, cotton, peanuts, and velvet beans, named in order of their acreage. Corn yields about 6 to 15 bushels per acre. Crops withstand drought well on this type. Winter oats make a good growth, but the acreage is small. The pasturing of cattle on the rougher areas, with the utilization of the tillable land to supply supplementary feeds is a growing industry which began about 10 years ago. Owing to extensive emigration from this type to other parts of the county, it is sparsely populated.

Plowing on this type is rarely more than 3 inches deep. The soil is in poor physical condition, owing to its low content of organic matter. The type also lacks lime. Protection from erosion is very necessary. The use of terraces and the growing of soil-binding grasses such as Bermuda grass should be employed wherever practicable. In tilled fields, deeper plowing, the addition of organic matter, and the growing of thickly sown winter cover crops are suggested improvements in method. Oats, rye, vetch, and crimson clover and rape mixed have proved valuable winter cover crops. A mixture of Bermuda grass and bur clover will protect the soil and furnish good pasturage throughout the year.

Susquehanna clay, hilly phase.—The hilly phase comprises those areas ot the Susquehanna clay that are too rough for farming or successful reclamation. The soil section does not differ materially from that of the eroded areas of the typical soil. The phase has been formed by the erosion of the Susquehanna fine sandy loam, very fine sandy loam, and clay types. It occupies narrow, intricately winding or broken and irregular ridges and rounded, choppy hills whose crests lie 75 to 200 feet above the narrow, winding channels of the intermittent streams. In secs. 7, 8, 9, and 10, T. 9 N., R. 7 E., to the south of Tinela, the range of elevation is over 300 feet. In many sections there are small patches aggregating several acres of tillable land.

The population is very sparse. Agriculture is not depended upon as a means of support, and the only industry is lumbering. In places scanty pasturage is available. The roughest parts of the phase are suited to forestry only, while the remainder will support a small number of goats or cattle.

Aside from the timber, the value of this land does not exceed $2.50 an acre.

ORANGEBURG GRAVELLY SANDY LOAM.

The surface soil of the Orangeburg gravelly sandy loam, to a depth of 6 to 8 inches, is a grayish sand, carrying from 40 to 75 per cent of rounded, waterworn quartz gravel of gray, white, and rusty-brown or reddish color, and in places less than 10 per cent of syenitic and granitic gravel. The subsoil is a red, gravelly sandy loam. The percentage of gravel is slightly lower in the subsoil than in the soil. Both soil and subsoil are loose and open, and contain considerable coarse sand, but there is always considerable fine material.

In some eroded areas, as west of Monroeville in parts of secs. 21, 22, 23, 26, 27, 28, and 29, T. 7 N., R. 6 E., the surface is reddish. If of sufficient importance, these areas would be mapped as the Greenville gravelly sandy loam.

The type is widely distributed over all the county, except the two northern tiers of townships. The surface is somewhat rougher than that of the Ruston gravelly sandy loam, the roughest areas lying near the Guin stony sandy loam. The drainage conditions are the same as on the other gravelly types. Underlying a considerable part of the sandy formation that gives rise to the Orangeburg, Ruston, Norfolk, and Greenville series at various depths is a gravelly deposit varying from about 8 to 15 feet in thickness. Where the sandy material has been eroded down to the gravel stratum, the gravelly soils of the county are formed, so that these types are always a product of erosion.

About 10 or 15 per cent of this type is under cultivation, and the acreage of tilled land is increasing. The type supports the same forest and pasture growth as the Ruston gravelly sandy loam, but owing to the higher percentage of fine earth in the 3-foot section this soil is more dependable for crop production, and higher yields are obtained.

The value of this land is slightly higher than that of the Ruston gravelly sandy loam, and areas located on main roads or near markets may sell for as much as the Orangeburg fine sandy loam.

The first requisite in the improvement of this land is the prevention of erosion. The formation of great gullies with precipitous fronts and sides that eat back into the flat upland can largely be prevented by installing drains. The ordinary washing of the surface can be almost entirely stopped by seeding to Bermuda grass or some other soil binding crop. This type is a warm, early soil, easily built up and kept in good condition, and is well adapted to cotton under the present boll-weevil conditions. Where used for cattle and hog raising, there is a general need for the improvement of the pastures. Aside from an occasional planting of Bermuda grass the present pasturage consists of natural grasses.

ORANGEBURG FINE SANDY LOAM.

Typically the Orangeburg fine sandy loam is a grayish-brown to light-brown or light reddish-brown fine sandy loam. The subsoil is a brick-red friable fine sandy clay. A moist lump pressed in the hand breaks into a granular, mealy mass, which clearly distinguishes it from the plastic subsoil of the Susquehanna series.

South of Monroeville and Perdue Hill the subsoil is more clayey and the sand is entirely of the finer grades, the material being much more compact and slightly less friable than in the typical areas. Throughout the county the type occurs in close association with the Greenville, Ruston, and Susquehanna series. All these soils have reddish subsoils, and it is difficult in places to establish definite boundaries. Some of the minor slopes are moderately gravelly. In places on very steep hillsides the soil has been removed and the subsoil exposed in large patches.

With the exception of a part of Tps. 9 and 10 N., R. 9 E., in the vicinity of Beatrice, the Orangeburg fine sandy loam is mapped in every township in the county. The largest area lies along the road from Wainwright to Franklin. This soil occupies higher elevations than any other type in the county except the Norfolk fine sand. It occurs on long, broken ridges and the tops of isolated hills. The topography is roughest in the northern and eastern parts of the county, where the type is associated with the Susquehanna series.

The drainage is good to excessive, and erosion more or less active. The soil, however, is very absorptive of rainfall, and the friable subsoil retains moisture well.

The Orangeburg fine sandy loam is the most extensive and important type in the county. Only eroded areas are allowed to revert to forest, and the percentage of tilled land has steadily increased until about 70 per cent of the type is under cultivation. The original forest growth was largely longleaf pine. The present growth is longleaf and shortleaf pine and oak, with some gum, chinquapin, persimmon, chestnut, and hickory. Lespedeza, carpet grass, and broom sedge are the most important pasture plants.

All the crops grown in the county except rice are produced successfully on this type. Corn yields 12 to 25 bushels per acre, and cotton does well. Sugar cane produces 150 to 200 gallons of sirup per acre. Millet can be cut several times each season, and sorghum, planted for both forage and sirup, makes a good growth. Oats do fairly well, and velvet beans and peas give good yields. Apples, summer varieties, yield as well as on any soil in the county. The Elberta peach is grown successfully, and on hilly eroded slopes pears of the Keiffer and Garber varieties succeed. A wide range of truck crops, including berries, cantaloupes, watermelons, pumpkins, squash, okra, collards, cabbage, radishes, English peas, lettuce, mustard,

Irish and sweet potatoes, and rutabagas, are grown for home use, and do well. There are a few commercial orchards of pecans which have not yet reached full-bearing age. The growth of the trees and the quality of the nuts seem satisfactory, and the plantings are being extended. In other parts of the State this type has proved well suited to pecans. Velvet beans, cowpeas, and peanuts do well.

More attention is given to maintaining the supply of organic matter than on most soils of the county; in other respects the fertilizer practices are similar. Manure gives good results for one year or two years after it is applied. Nitrogenous fertilizers have noticeably beneficial effects.

The type sells for $10 to $25 an acre, depending mainly on location.

Orangeburg fine sandy loam, flat phase.—The soil of the Orangeburg fine sandy loam, flat phase, is a light-brown to dark-grayish fine sandy loam, 6 inches deep, having a more loamy feel and slightly greater adhesiveness than the main type. The subsoil is a dark-red, brittle, compact, heavy fine sandy clay. With increasing depth the subsoil in many places passes into a yellowish to reddish-yellow fine sandy clay, and the phase may merge gradually into the Norfolk fine sandy loam, flat phase.

The Orangeburg fine sandy loam, flat phase, lies southwest and southeast of Roy in the two southern tiers of townships, and ranges in elevation from about 200 to 400 feet above sea level. A few areas occur in the northwestern part of the county. The surface is flat to very gently undulating. There are few streams, but these usually flow in channels 100 to nearly 200 feet in depth. The drainage is generally good, although the escape of surface waters is very slow in some places. This is considered an advantage, as it prevents erosion and the washing away of vegetable matter. The accumulation of vegetable remains gives rise to the deep color and is one of the factors in the relatively high productiveness of this soil.

Over three-fourths of the phase has been cleared and fully 95 per cent of the cleared land is under cultivation. Dense forests of longleaf and shortleaf pine made up the original growth, with a few oak, gum, and other native trees in lower areas. Very little of the phase is in pasture.

The chief crops are cotton, corn, peanuts, and velvet beans, with some sugar cane. Cotton does well in dry years. In wet seasons the yield is low. Corn averages about 20 bushels per acre and higher yields are not unusual. The heavy corn yield enables the farmers to raise large numbers of hogs, which are usually pastured on the hilly types in the summer and fattened on corn, peanuts, and velvet beans before slaughtering. Oats are grown on many farms and good yields are obtained. Sugar cane gives large yields of sirup of good flavor and keeping qualities, but lacking the light-straw or honey color de-

manded by the trade in the best grades. With the exception of cotton all the crops grown produce better yields than on the typical soil. Smaller fertilizer applications are used on this phase than on the typical soil.

The selling price of this land ranges from $35 to $150 an acre, depending largely on location. Very little is on the market.

Farms on this phase are operated mainly by the owners and the land is generally in a good state of cultivation. There is room for improvement in farm practices. In addition to deeper plowing and liming, there is a general need for the rotation of crops. This would result in more permanent improvement than is possible with the present fertilizer practices. This phase is well adapted to the production of subsistence crops and to any form of intensive agriculture possible under the prevailing climatic conditions.

NORFOLK FINE SAND.

To a depth of 5 inches the Norfolk fine sand is a very light gray or light-brown to whitish fine sand, though in forested areas the accumulation of vegetable matter imparts a dark-gray color and more loamy texture. Scattered yellow iron concretions and small quantities of gravel are present. Patches of white quartz sand, analyzing 95 to 98 per cent sand, are of frequent occurrence. The subsoil is a pale-yellow, incoherent sand, which may extend without change to depths of 6 or 8 feet. A substratum of yellow, close-structured, fine sandy clay is encountered at depths of 4 to 10 feet. This stratum has some beneficial influence on the soil where relatively near the surface.

At the foot of some of the slopes this type is of colluvial origin. Areas of this character occur in sections 13, 14, 16, and 17, T. 7 N., R. 7 E., on the north bank of Limestone Creek. Such areas are slightly more loamy and more eroded than is typical, and small patches of Norfolk gravelly sandy loam are frequently included. Seepage waters accumulate in places, and hillside springs are common.

With the exception of the clayey regions about Beatrice, the Norfolk fine sand is found in every part of the county. A large and typical area lies between Peterman and Tunnel Springs, extending eastward to the county line. The typical areas occupy moderately rolling uplands, broad plateau-like interstream regions, isolated hilltops, and remnants of winding ridges. This type has the highest elevations of any soil in the county, the greater part lying 400 to nearly 600 feet above sea level.

The Norfolk fine sand is a loose, leachy, droughty soil, but, owing to its porous nature, it absorbs nearly all the rainfall, and in wet seasons it may become water-logged. While in this condition it erodes easily and considerable injury may be done to cotton and other crops.

This is one of the extensive types of the county. It is widely settled and about one-third of it is cleared and under cultivation. Extensive areas have been allowed to revert to forest. The original forest growth consists of longleaf pine, and the type is commonly referred to as "piny-woods land."

Cotton, corn, velvet beans, peanuts, cowpeas, sorghum, and sugar cane are the chief crops, named in order of acreage. Apples, pears, peaches, plums, pomegranates, and figs are grown to some extent. Winter oats are not grown, as the type is considered too light, but oats and rye, combined, make a good winter cover and pasture crop.

Owing to the droughty nature of this type, cotton does better than corn. Corn yields 5 to 8 bushels per acre. Cowpeas do fairly well either as a grain or hay crop. Peanuts make a fair growth, but produce many "pops," or unfilled nuts. Velvet beans are almost certain to produce well. The practice of alternating rows of legumes with other intertilled crops is common. After the harvesting of corn or watermelons, light yields of hay are obtained.

Large quantities of fertilizer are needed on this type. Fertilizers give good results except in extremely wet or dry seasons. Without fertilizer the yields of cotton, and especially of corn, may be low and unprofitable. Cotton normally matures about 10 days to two weeks earlier than on the heavier soils, and this is an important factor in combating the boll weevil. The type does not seem well adapted to tree fruits, although in Bullock County, Ala., there is a large commercial peach orchard on similar soil.

This soil requires careful methods of handling and improvement. It is naturally of low productiveness, and is easily exhausted, Crop rotation is highly beneficial. One successful form of rotation consists of cotton the first year, the stalks to be cut or plowed under immediately after picking, followed by a winter cover crop of oats, rye, or vetch; second year corn, with velvet beans, peas, or peanuts between the rows, followed by a cover crop; and third year cotton.

NORFOLK FINE SANDY LOAM.

The surface soil of the Norfolk fine sandy loam, to a depth of 5 or 6 inches, is a loamy fine sand to light fine sandy loam. This grades into a yellowish fine sandy loam which extends to a depth of 15 to 30 inches. There is usually enough fine material to make the type slightly coherent when wet, and scattered soft, yellowish iron concretions are present. The subsoil is normally a deep-yellow, friable fine sandy clay. In poorly drained areas the lower subsoil may be matted with gray and sometimes in higher areas with streaks of red.

The Norfolk fine sandy loam has a scattered and irregular distribution. As mapped in this county it occupies for the most part

high, terracelike positions. The largest area lies near Vredenburgh. At Claiborne the type occupies an old terrace nearly 200 feet above the level of the river.

The surface is moderately rolling to undulating, and is cut by small, intermittent streams flowing in shallow valleys with moderately sloping sides. The elevation ranges from about 100 feet at Vredenburgh to 250 feet at Claiborne, with some higher areas. About 80 per cent of the type is tillable, and about one-half its area is under cultivation. A small part is in pasture. Uncleared areas support a growth consisting mainly of longleaf pine, with some shortleaf pine and a scattering of oak, persimmon, and other trees.

Cotton, corn, and oats are the main crops. The acreage in sugar cane is increasing. Cane sirup of good flavor and color is produced. The ordinary legumes, grown for hay and pasturage, do well. The usual tillage and fertilizer practices are followed.

The Norfolk fine sandy loam sells for $10 to $15 or possibly more an acre.

For its improvement this soil requires the same general treatment as the other sandy types. It is well adapted to specialized and diversified farming.

Norfolk fine sandy loam, flat phase.—The flat phase differs from the typical Norfolk fine sandy loam in having slightly more soft iron concretions in the 3-foot section, in being less thoroughly drained, and in being more mottled with gray in the subsoil. The phase occupies flat, plainlike areas south of Roy. Drainage for the most part is fairly well established, but certain areas would be benefited by ditching or laying tile drains.

This is an important soil. About 90 per cent is tillable, and approximately 60 per cent has been cleared and is under cultivation. About the same crops are grown as on the typical soil and the yields average slightly higher. The phase is less subject to erosion than the typical soil. Organic matter does not disappear so quickly and the effects of fertilizer are more lasting. Cotton has a tendency to shed its bolls in wet weather, and therefore does not fruit so well as on better drained soils.

The undrained areas can be improved in the same manner as the poorly drained phase of the same type. The phase is in need of the same general improvement as the flat phase of the Orangeburg fine sandy loam.

Norfolk fine sandy loam, poorly drained phase.—To a depth of 10 inches the Norfolk fine sandy loam, poorly drained phase, is a gray fine sandy loam. In depressions, owing to the accumulation of organic matter, the soil may be nearly black, but under tillage it bleaches to an ashy gray. The upper subsoil is a yellow fine sandy clay. This grades into a mottled yellow and gray fine sandy clay.

In many places the lower subsoil has a bluish color. It is usually water-logged, and like the soil has a lifeless appearance. Small areas of the Plummer and Portsmouth fine sandy loam are included with this phase.

The largest area of the poorly drained phase occurs north of Roy in secs. 29, 30, 31, and 32, T. 6 N., R. 7 E. Other areas lie east of Eliska and north of Conoly. The areas are flat or depressed, which partly accounts for the poor surface drainage. Large areas may be covered with water in wet seasons, and this excess water escapes very slowly. The lack of drainage is due in part also to an impervious stratum lying several feet below the surface.

The Norfolk fine sandy loam, poorly drained phase, does not have a large total area in this county, and only a small part of it is cleared. The remainder is covered with a very dense growth of shortleaf pine, swamp pine, magnolia, bay, swamp maple, sweet shrub, switch cane, sedges, rushes, and gallberry. The local name "gallberry land" is applied to the phase because of the abundance of this plant.

In seasons of light rainfall, when the conditions are most favorable, yields of 15 to 20 bushels of corn and only fair yields of cotton are obtained. Cane does well, and large yields of sirup are produced. Rice is grown in small patches for home use, and yields well. Peanuts do fairly well, the soil apparently needing lime to make it suitable for this crop. Forested areas are generally pastured. The phase alone has a relatively low value, and it is generally sold in connection with better land.

This soil is primarily in need of drainage. The present open ditches are inadequate. Under similar conditions elsewhere the use of open or closed ditches with tile laterals spaced 20 to 40 feet apart has proved successful. Experience elsewhere indicates that such land when first cleared should be plowed in the fall and given an application of burnt lime at the rate of at least 2,000 pounds per acre. Liming unless preceded by draining has only a very temporary effect.

LAUDERDALE STONY CLAY.

The surface soil of the Lauderdale stony clay is quite variable in both texture and structure. Usually the fine earth consists of light-gray or whitish to reddish-yellow loam, with which is mixed from 25 to 75 per cent of siliceous rock fragments of varying shapes and sizes. There is no clear line of separation between the soil and subsoil, but below the zone of gradation there lies a greenish to yellowish or reddish clay also containing fragments of the parent rock—a highly siliceous, soft, whitish to light-grayish rock, showing many black stains due to hydrated iron oxide. The type contains numerous outcrops of this rock and near Bowdens Landing and in a few other places outcrops of white limestone are included.

The Lauderdale stony clay is almost entirely confined to the three northern tiers of townships, from Midway southwestward to Claiborne. The largest and most typical body lies between Kearleys and Robinson Bridges on the south side of Robinson Creek.

The different strata of rock have weathered unequally, resulting in a broken, hilly surface. Like the Guin stony sandy loam the type resembles a mountainous region in minature. The run-off is excessive, and erosion is active.

This type is nonarable. It may be used to some extent for goat pasture, especially where the forest growth is not thick. Its principal value lies in its forests. In its virgin condition the type usually supports a good stand of timber. Shortleaf pine on the lower slopes and longleaf pine in the higher areas are of commercial value.

RUSTON GRAVELLY SAND.

The Ruston gravelly sand consists of a light-gray to grayish-brown gravelly sand, 10 to 20 inches deep, underlain by a reddish-yellow or dull-red gravelly sand which extends to a depth ranging from 3 to 12 or 15 feet. Rounded quartz gravel is scattered throughout the 3-foot section, constituting 40 to 90 per cent of the soil mass.

Included with this type are areas of the Norfolk gravelly sand, which has a yellow subsoil, and the Orangeburg gravelly sand, having a bright-red subsoil, and also patches of the Ruston gravelly sandy loam and Orangeburg gravelly sandy loam. All these are too small to be shown on a map of the scale used in this survey.

The Ruston gravelly sand is largely of colluvial origin. The main area forms a strip, varying in width from one-fourth mile to about 2 miles, extending along the north side of the Little River from its head to its confluence with the Alabama River. Small areas along the smaller intermittent branches in the southern part of the county are not separated on the map, as they are not important agriculturally.

The surface of the Ruston gravelly sand is hilly to moderately rolling. The type occupies the lower part of the slopes, extending from the uplands to the stream bottoms. It is dissected by short streams, with flat swampy bottoms. Owing to its topographic position and the loose, incoherent structure of both soil and subsoil, drainage is excessive and erosion active. The type is not cultivated and under present conditions can not be farmed profitably. It supports a fair growth of longleaf and shortleaf pine, and a scrubby growth of oak. Broom sedge furnishes scanty pasturage during the spring and early summer.

This type sells for $5 to $15 an acre, its value depending on the timber growth.

RUSTON GRAVELLY SANDY LOAM.

The Ruston gravelly sandy loam is a type of prevailingly rough topography, and of variable texture. In the principal agricultural areas the soil for the most part is a gray sandy loam averaging about 6 inches in depth, containing 50 to 75 per cent of rounded, water-worn quartz gravel. The subsoil is a dull reddish yellow, gravelly sandy loam of uniform texture and color. Both soil and subsoil are loose and porous, and water passes through the material very rapidly. Fragments of ferruginous sandstone frequently occur, and soft iron concretions about the size of a pea are distributed through the 3-foot section and locally scattered over the surface.

Occasionally rather thick strata of sandstone or gravelly sandstone outcrop on the eroded slopes of hills, as on Butter Fork Creek to the south of Blacksher, in Baldwin County.

The Ruston gravelly sandy loam is one of the more extensive types in the county. With the exception of a few of the northeastern townships, where the Susquehanna soils predominate, it is distributed throughout the county. An important area lies about the headwaters of Lovetts and Randons Creeks, from Jeddo westward to Homewood and northeastward to Perdue Hill and Mexia. As a rule the type occupies the lower stream slopes and lies at lower elevations than the closely related Orangeburg fine sandy loam and gravelly sandy loam and Ruston fine sandy loam. A large part of the type is of colluvial origin, resulting from the slow downward movement of soil material from steep slopes. It largely occupies irregular, narrow, winding ridges and hills with steep slopes. Wet-weather branches have cut tortuous courses through the type and erosion is active.

Drainage is excessive and the run-off very rapid, except in the flatter areas, where a large part of the rainfall is absorbed. During very wet seasons the water passes immediately downward and the land does not become water-logged as does the Norfolk fine sand. In dry periods the upward movement of capillary water is aided by the porous substratum. Crops therefore do relatively well in seasons of extremely wet or dry weather.

Ten to 15 per cent of this soil is under cultivation. The tilled land is confined to the flat-topped ridges and gentle slopes. Longleaf pine is the main tree growth, with stunted oak and old-field pine in reforested areas. Blackjack oak, post oak, Spanish oak, turkey oak, and water oak grow in dry locations.

Cotton, the main crop, gives low but dependable yields. Corn yields 5 to 7 bushels per acre. The usual shallow tillage, with contour plowing and terracing, is practised. Fertilizers are in general use.

Recently cleared land of this type sells for $3 to $4 an acre, and forested areas for $10 to $20 an acre.

The greater part of this type, owing to the low percentage of tillable land and its general inferiority for pasture, is best adopted to forestry. Tillable areas require the same general methods of improvement as the Orangeburg gravelly sandy loam, although in general this type is less productive than the Orangeburg.

RUSTON FINE SANDY LOAM.

The soil of the Ruston fine sandy loam is a gray loamy fine sand to light fine sandy loam, 4 to 6 inches deep, resting on a yellowish, light fine sandy loam, which extends to a depth of 10 to 24 inches. The subsoil is a reddish-yellow to yellowish-red fine sandy clay, which from a depth of about 24 to 36 inches is usually mottled sparingly with shades of yellow, rusty brown, and gray.

In places on moderate stream slopes and in hilly regions this soil is a loamy fine sand extending to a depth of 3 feet or more, but where the slopes are steep the sand may have been entirely removed and the subsoil exposed and gullied. There is often considerable gravel on these steeper slopes. South of Roy there are scattered areas of the type having a flat surface.

This type varies somewhat in color and in texture. It is associated with the Norfolk, Orangeburg, and Susquehanna fine sandy loams, and in places the material approaches the characteristics of these soils.

The Ruston fine sandy loam is widely distributed over the county. Typical areas are found south and southeast of Monroeville in secs. 11 and 12, T. 6 N., R. 7 E., and in secs. 17 and 18, T. 7 N., R. 8 E.

The surface varies from flat to rolling and hilly. The drainage over the most of the type is good, and in places it is excessive. On some of the lower slopes there is considerable seepage, and these areas are not farmed.

The Ruston fine sandy loam is easily handled and is largely under cultivation. At least 75 per cent of the type can be tilled, and approximately 60 per cent of the tillable area is under cultivation. Forested areas support a growth consisting mainly of turkey oak and blackjack oak on the drier and sandier knolls, and longleaf and shortleaf pine in other situations. The forest growth includes also chestnut and chinquapin, basswood, persimmon, and sassafras, with an undergrowth of shrubs and vines. Legumes, such as lespedeza, beggar weed, wild vetch, with sedges and a number of native grasses, furnish good pasturage.

The yield of corn averages 10 bushels per acre. A yield of over 20 bushels is sometimes obtained. The average yield of cotton is moderate. A high-grade cane sirup has been produced commercially in a small way. There are a number of orchards of seedling and some

budded pecans on the type. Peaches make a good growth, and apples, summer varieties, do as well as on any type in the county. The type is adapted to a wide variety of garden and truck crops, and with good market facilities the commercial production of such crops should prove profitable.

The price of land of this type ranges from $5 to $20 an acre.

With the addition of organic matter and the use of fertilizer the present average yields of crops on this soil could be materially increased. Deep plowing, growing and plowing under leguminous crops, and the rotation of cotton, cowpeas, oats, and corn are suggested for improvement of the soil. The application of about 1,000 pounds per acre of burnt lime or 2 tons of crushed limestone rock also would be beneficial.

The results of mechanical analyses of samples of the soil and subsoil of this type are given in the following table:

Mechanical analyses of Ruston fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
415303	Soil	1.9	10.9	11.2	33.6	11.4	23.6	7.7
415304	Subsoil	.8	4.7	4.9	27.4	11.0	15.6	35.7

GUIN STONY SANDY LOAM.

The Guin stony sandy loam is a classification of soil materials based on topography rather than the usual type or series distinctions. It consists of patches of the Ruston, Orangeburg, Norfolk, Lauderdale, Greenville, and Susquehanna soils so intimately mixed that separation on a small scale map is impracticable. The material is nowhere uniform; within distances of a few feet it may vary widely in color, structure, and texture.

Small elongated patches of this soil in valleys or capping flat hilltops and narrow, winding ridges are tillable, such areas possibly making up 5 per cent of the type. The type is now practically uninhabited.

Most of the Guin stony sandy loam lies in the northern two-thirds of the county, on the eroded slopes of Flat Creeks and their tributaries. Local differences in elevation of over 300 feet within a mile are not unusual, and on the intervening steep slopes three or four geological formations may be exposed. The type is referred to locally as "hills and hollows" and "gullies and washes." Drainage is excessive.

The lower areas support a growth of swamp pine, pond cypress, willow, ironwood, beech, cottonwood, sycamore, water oak, bay,

magnolia, swamp maple, black gum, tupelo gum, swamp chestnut oak, and mulberry. The forest of higher areas comprises cedar, chestnut, basswood, sweet gum, redbud, chinquapin, white oak, cucumber trees, dogwood, and black oak. On the driest parts longleaf and shortleaf pine, hickory, post oak, turkey oak, and blackjack oak are found.

Owing to its rocky nature this land has a low value for pasture, even for goats. Pasture grasses make a scanty growth. The type seems adapted only to forestry.

GRADY CLAY LOAM.

The soil of the Grady clay loam, to a depth of 4 to 6 inches, is a dark-gray to almost black, friable silty loam to clay loam, containing a high percentage of vegetable matter. The subsoil is steel gray or drab, mottled with rusty brown, and consists of heavy, impervious, plastic clay or silty clay. In some places red mottlings are common, while in others the gray or whitish subsoil extends without mottling to a depth of 3 feet or more.

Marginal areas of this type frequently consist of heavy loam or fine sandy loam, representing a graduation between the typical clay loam of this type and the loams or sandy loams of the Orangeburg, Norfolk, and Ruston series which often surround it.

The Grady clay loam occurs in shallow depressions, or lime sinks, in the flat uplands of the southern part of the county. These depressions are formed by a gradual lowering of the surface upon solution of the underlying limestone. The areas vary in size from patches too small to be mapped satisfactorily to tracts of 160 acres or more. The type has no natural drainage outlets, and owing to the impervious nature of the subsoil it is covered with water four to eight months of the year. There are some permanent ponds, which are indicated on the soil map.

Tupelo gum is the characteristic growth on this type. In the permanently wet areas the trees are chiefly pond cypress, with a few swamp pines. The greater part of the type can be drained by shallow ditches.

The Grady clay loam seems best suited to rice production. The yields of this crop are estimated at 20 to 40 bushels per acre. Good yields of corn, sugar cane, and sorghum are obtained in seasons of moderate rainfall. Lespedeza, various sedges, and carpet grass furnish good pasturage.

This type has about the same value as the surrounding soils. Prices range from $25 to as much as $100 an acre.

Applications of slaked lime and the addition of stable manure have proved effective in increasing the yields of crops on land of this type.

PLUMMER FINE SANDY LOAM.

The Plummer fine sandy loam consists of a gray loamy fine sand to fine sandy loam, underlain at an average depth of 6 inches by a lighter gray loamy fine sand, which passes at about 20 inches into a mottled gray and yellow fine sandy clay. In depressions a heavy, sticky, plastic clay, mottled with red, gray, and rusty brown, is encountered in the lower part of the 3-foot section.

This type occurs in the southern third of the county, the largest areas lying south of Cedar Grove Church and Mount Pleasant. It occupies gentle slopes and depressions, usually around the heads of small streams. Many patches at the heads of streams having their origin in the Ruston and Orangeburg gravelly sandy loams are included with these types, as they are too small to be mapped separately.

The Plummer fine sandy loam is underlain at depths ranging from 3 to 8 or 10 feet by impervious strata of clay, fine sand, or fine sandy clay, which prevent underdrainage and are the important factor in the development of the type. These strata also underlie the higher adjoining types, and cause a gradual lateral movement of underground waters which finally escape at the heads or along the banks of the smaller streams, giving rise to the permanently wet condition characteristic of the Plummer fine sandy loam.

None of the Plummer soil is under cultivation in this county, and in its present condition farming it would not be profitable. If drained by open ditches or tile, low to moderate yields of corn, sorghum, and velvet beans might be obtained.

The type is forested with longleaf and shortleaf pine. Scanty pasturage, consisting mainly of sedges, is available during the spring and early summer. Gallberry is a characteristic growth in the wetter areas, and the type is locally known as "gallberry land."

The value of this soil depends on the stand of timber. It ranges from about $5 to $10 an acre.

CHATTAHOOCHEE FINE SANDY LOAM.

To an average depth of about 8 inches the Chattahoochee fine sandy loam is a light-gray fine sandy loam, having a friable structure and a mealy feel. The lower part of the soil usually has a slightly reddish tinge. The subsoil is a red, friable fine sandy clay resembling in all important features the Orangeburg subsoil. In a few of the lower depressions the lower subsoil is mottled with yellow.

This type is developed in scattered areas on the high second and third terraces of the Alabama River. A typical area occurs in the SW. ¼ sec. 8, T. 7 N., R. 6 E. Another extensive area is situated on the west side of the river in Packers Bend, in secs. 16 and 17, T. 9 N., R. 6 E. The surface varies from nearly level to very gently undulating. Except in strips along the terrace edge, the areas are only

slightly affected by erosion. They occupy the highest elevation of any of the terrace soils, lying 30 to 60 feet above the present high-water level. The drainage is good.

About three-fourths of the Chattahoochee fine sandy loam is under cultivation. The remainder is forested with longleaf and shortleaf pine, gum, oak, persimmon, and dogwood. Cotton is the main crop. The soil is easily tilled and seems well adapted to cotton under boll-weevil conditions. Corn yields 10 to 20 bushels per acre. Velvet beans, peas, and peanuts produce good average yields. Tillage and fertilizer practices are similar to those on the Orangeburg fine sandy loam.

Land of the Chattahoochee fine sandy loam type has an average value of $10 to $15 an acre.

With the exception of terracing this type is in need of the same general treatment for its improvement as the Orangeburg fine sandy loam.

CAHABA FINE SANDY LOAM.

The soil of the Cahaba fine sandy loam is a friable, light, fine sandy loam, ranging in depth from about 6 to 15 inches. It is characteristically brown, often with a slight tinge of red; even in its most weathered and bleached condition the color is unmistakably darker than that of the adjoining terrace soils. The texture varies somewhat, being coarser on the small, rounded elevations. Mica flakes are common. The color gradually becomes more reddish and the texture heavier until the subsoil is reached. This varies from reddish or brownish to yellowish-brown fine sandy clay. The yellowish-brown color with some slight mottlings of yellow is characteristic of the subsoil below 30 inches. Soft concretions similar to those found in the subsoil of the Cahaba silt loam are present. North of Packers Landing in the southern part of T. 10 N., R. 6 E., there are areas where it is difficult to draw a definite boundary between this type and the Leaf fine sandy loam, and similar areas occur south of Haynes Island in secs. 27, 28, and 32, T. 9 N., R. 6 E.

The type occurs almost exclusively on the second and third terraces of the Alabama River. The surface varies from flat to gently sloping, with local differences in elevation of 2 to 20 feet. The type lies above normal overflow, although small strips may be flooded by exceptionally high waters. The drainage is slow, but is thorough, except in the vicinity of a few shallow depressions, where it is deficient. The open structure and friable nature of the subsoil are favorable to drainage, and the type is considered a warm, early soil.

The Cahaba fine sandy loam is largely under cultivation, probably little more than one-fourth being forested. Shortleaf pine is the predominant growth in the higher areas. Oak, sassafras, persimmon, and gum have a general distribution, and black gum, tupelo gum,

and a scattering of cypress occur in the depressions. Lespedeza, carpet grass, and sedges constitute the principal pasturage plants. Good yields of wild hay are obtained. Cotton was the chief crop before the appearance of the boll weevil. At present the acreage of corn, oats, and leguminous hay crops is increasing. Corn yields 10 to 20 bushels per acre. In general, crop yields vary widely, depending on the season. The type is more susceptible to moisture extremes than the Cahaba silt loam, and yields average somewhat lower. The yields average slightly higher, however, than on the Kalmia fine sandy loam.

The crop rows are usually run so as to facilitate drainage and the crops are planted on beds to lessen the effects of standing water in case of heavy July rains. The tillage and fertilizer practices do not differ from those on the Kalmia fine sandy loam.

This type is valued at $10 to $15 an acre.

With tile drains to remove excess rainfall, crops could be planted on a level surface and would be able to withstand dry periods better than where grown on beds, which is considered advisable under present conditions. With good market facilities the type could probably be used profitably for the production of market-garden and truck crops. It is in need of organic matter and the growing of soy beans, crimson clover, bur clover, and lespedeza in proper rotations is beneficial. In its present condition large applications of fertilizer are needed to insure profitable yields.

CAHABA SILT LOAM.

The Cahaba silt loam, to an average depth of about 6 inches, is a brown silt loam having a friable structure and a floury feel. The subsoil to a depth of about 24 inches is a dull reddish-brown clay which is stiff, compact, and slightly sticky. From 24 to 36 inches or more the material is dull-reddish mottled with yellow, and consists of a tough clay. Soft, dark-brown to black iron concretions are numerous in the subsoil. In the best-drained locations, as in N. ½ sec. 19, T. 10 N., R. 7 E., the subsoil has a dull-red color with a slight mottling of yellow below about 30 inches.

With the exception of a few small areas near the Baldwin County line, this type is confined to the northwestern part of the county, where it occupies high second terraces along the Alabama River. The surface is flat to gently sloping. The drainage is comparatively good, being aided by numerous sloughs, through which the run-off slowly escapes. The type lies above ordinary overflow.

This is one of the best terrace soils of the county, and nearly all of it is under cultivation. It is successfully utilized for corn, cotton, grass for hay and pasture, winter oats, and cowpeas.

Yields of 1 ton of cowpea hay or one-half to one-fourth ton of crab-grass hay, 10 to 20 bushels of corn, and 20 to 40 bushels of oats per acre are reported. The usual shallow tillage prevails. The type responds readily to the commercial fertilizers commonly used in the county.

The selling price of this land ranges from $5 to $25 an acre, depending mainly on location and to some extent on improvements.

The implements and work stock used are not heavy enough to plow the soil to more than one-half the proper depth, and crops suffer in dry seasons for lack of moisture where they would not if a deeper seed bed were prepared. The type is well suited to the use of power-propelled farm machinery. The use of lime and the plowing under of vegetable matter are needed to increase the productiveness and improve the physical condition of the soil. The type is well suited to feed crops and might successfully be utilized for stock raising.

KALMIA FINE SANDY LOAM.

Typically the Kalmia fine sandy loam is a gray fine sand to loamy fine sand, which grades into a yellow fine sandy loam or loamy fine sand at a depth of about 6 inches. This continues without marked change to depths of 10 to 20 inches. Rounded quartz gravel is present in this soil, especially on the slopes facing the larger streams, and scattered iron concretions are of common occurrence throughout the type. The subsoil to a depth of about 36 inches is a yellow heavy fine sandy loam to fine sandy clay, often mottled with yellow and rusty brown below 24 inches. The extent and character of the mottling are dependent upon the drainage. Small areas of the Myatt fine sandy loam and Cahaba fine sandy loam, of insufficient extent and importance to warrant separation, are included with this type. On the broad river terrace the type resembles the Myatt fine sandy loam. South of Monroe Station, near Bradley Landing on the Alabama River, and in other places small areas of the Kalmia fine sand are included. These closely resemble the Norfolk fine sand of the upland proper.

The Kalmia fine sandy loam has a general distribution along many of the larger creeks and the Alabama River. Important areas occur west of Eliska in secs. 31 and 32, T. 5 N., R. 4 E., in sec. 5, T. 4 N., R. 4. E., and also along Limestone Creek north of Monroeville, in T. 7 N., Rs. 7 and 8 E. The terraces of the Flat Creeks are occupied in large part by very plastic clays, and the lighter Kalmia soils are found there only in two areas northwest of Scotland in secs. 5 and 6, T. 8 N., R. 8 E.

The Kalmia fine sandy loam occupies gently sloping to flat terraces, and is generally well drained. Broadly it represents a transition from the higher lying well-drained Chattahoochee fine sandy

loam to the flat, poorly drained Myatt fine sandy loam. There is usually a distinct step from the flood plain to the second terrace. The break between the terrace and the upland is normally very marked, although there may be such a gradual change from the terrace to the upland Norfolk fine sand areas as to make the placing of the boundary between the Kalmia and the Norfolk soil largely arbitrary. The type is not normally overflowed to any extent, although much of it was flooded in 1916.

A large part of this type has been under cultivation since about 1850, and it is considered a productive and dependable soil. More than three-fourths of it is under cultivation, the remainder supporting a growth of shortleaf pine, gum, and oak, with some elm, wild plum, persimmon, and sassafras. Corn promises to become the leading crop on this type, cotton being restricted to the better drained areas. The same general crops are produced as on the Cahaba fine sandy loam. The average yields are said to be slightly lower. Pecan trees have been planted on this type, and seem to grow more rapidly than on the drier upland types. Results on the poorly drained land have so far been discouraging.

Land of the Kalmia fine sandy loam type sells for about $8 to $12 an acre.

The chief need of this type is drainage. It also lacks organic matter. Rotations, including occasional crops to be plowed under, should be used to correct this deficiency. Prior to the Civil War deep open ditches and protecting levees were maintained.

LEAF FINE SANDY LOAM.

The surface soil of the Leaf fine sandy loam is a gray loamy fine sand to light fine sandy loam, underlain at an average depth of about 5 inches by a yellow fine sandy loam, which extends to a depth of 10 or 15 inches, gradually becoming heavier with depth and showing, in the lower part, reddish colors.

The subsoil is a reddish-yellow to dull-red fine sandy clay, which at about 24 to 30 inches passes into a plastic clay marked with streaks of bright red and yellow. In the better drained locations the type resembles the Susquehanna fine sandy loam, from which it is largely derived. In the northern part of the county both soil and subsoil have a higher percentage of fine material than in other places.

The Leaf fine sandy loam occurs in scattered areas along Big Flat, Tallatchee, Limestone, Turkey, and Bear Creeks, where it occurs as narrow, flat strips between the upland and flood plain. The large area near Davis Bridge west of Scotland, in secs. 3, 4, 9, and 10, T. 8 N., R. 7 E., is typical. The large body lying between Flat and Limestone Creeks and the Alabama River, in secs. 9, 10, 15, 16, 17, and 18, T. 7 N., R. 6 E., and the areas at Nadawah occupy broad,

material. Near the many springs and seepage spots the common bottom-land type of tree growth is seen.

This land is held in large tracts and its value is based upon the stand of timber. Some of the areas could be used for pasturing sheep and goats.

ROUGH BROKEN LAND.

The term Rough broken land is applied to rough, steep mountain slopes and breaks. The areas are free from large quantities of stone, though some sandstone ledges or fragments occur in places, as indicated on the map by outcrop, stone, or gravel symbols. The soil consists of Dekalb or Hanceville material, mainly the latter. The surface layer of a few inches is in most cases of fine sandy loam, loam, or clay texture.

The Rough broken land is usually situated above the zone of limestone outcrop on the steep upper slopes of the mountains, or in places where the underlying limestone soils have been nearly covered by deep deposits of colluvial material from the upper slopes. Owing to the steep topography the type has little or no agricultural value. It is covered with a first or second growth of shortleaf pine, oak, and hickory, and its chief value is in the timber. Sheep and goats could be pastured cheaply on this land. The type is held in large tracts by the owners of the more desirable adjacent soils.

SUMMARY.

Morgan County is situated in the northern part of Alabama, the Tennessee River forming the northern boundary. The county comprises lowland-belt (Limestone Valley), mountain, or upland-belt, and stream bottom divisions, the topography ranging from flat to gently rolling in the valley sections, from gently undulating to rolling on the plateau tops, and from moderately steep to steep and broken on the mountain slopes. The elevation ranges from somewhat more than 500 feet above tide along the Tennessee River near Decatur to 1,200 feet above on the highest crests of the mountains.

Morgan County lies in the Tennessee drainage basin. In the mountains the stream channels are deep and the currents swift, but in the valleys the flow is gentle.

The population of Morgan County in 1920 was 40,196, of which two-thirds was classed as rural. The inhabitants are largely descendants of the early settlers, though in the Moulton and Tennessee Valleys and in a few other places there is a large colored population.

Corn and cotton are the principal agricultural products of the county. Cotton is by far the most important cash crop, though there is a surplus of corn for sale. The minor crops include peanuts, oats, Johnson grass, red clover, redtop, velvet beans, cowpeas, wheat,

In the following table are given the results of mechanical analyses of samples of the soil and subsoil of the Leaf silt loam:

Mechanical analyses of Leaf silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
415339	Soil	0.2	0.6	0.6	4.6	10.4	62.7	20.9
415340	Subsoil	.0	.4	.4	2.6	6.0	41.7	49 2

MYATT FINE SANDY LOAM.

To a depth of about 4 inches the soil of the Myatt fine sandy loam usually is a gray fine sandy loam. In areas that have been tilled for some time the color is a bleached, whitish gray. In depressions where there is considerable vegetable matter in the first few inches it may be dark gray to nearly black. The material is somewhat sticky and compact when wet, and loose and floury when dry. To a depth of about 15 inches the subsoil is a grayish, plastic clay, with yellow and rusty-brown streaks. Below this there is generally no mottling, and the color ranges from a dull steel gray to pale bluish gray. The clay is sticky, plastic, and very heavy and impervious, and boring is difficult.

The Myatt fine sandy loam is of small extent. It occurs in scattered areas, the largest being in secs. 13, 18, 7, and 12, T. 4 N., R. 3 E., southwest of Eliska.

The surface is flat or depressed. There are many sloughs and incipient drainage ways through which the water flows sluggishly. After a heavy rainfall, considerable water remains on the surface in small pools until evaporated. The impervious subsoil hinders the free passage of water downward, and is unfavorable to its return during dry seasons by capillarity. Crops are subject to injury by extremely wet or dry weather.

The agricultural value of this type depends largely on the season and on drainage conditions. Although in many places it has a lifeless appearance, where well drained it seems to be a strong soil. A small part is tilled, and under very favorable seasonal conditions good yields of corn are obtained. Where not injured by floods oats make good winter pasturage. In general, however, the crop is uncertain. The forest growth consists of tupelo gum, sweet gum, cypress, bay, magnolia, and swamp pine. Sedges, rushes, switch cane, and acquatic plants constitute the main pasturage plants. These are supplemented by lespedeza, broom sedge, and carpet grass. The type is used mainly for pasturing beef cattle and hogs. Its value is rather low, the land usually being sold in connection with areas of more valuable soils.

Favorably situated parts of this type can be drained and leveed, though under present conditions the expense of such improvement hardly seems warranted.

BIBB CLAY LOAM.

To a depth of about 4 inches the Bibb clay loam is a whitish to grayish clay loam, with brownish streaks. It is stiff and plastic when wet, and floury when dry. In forested areas the immediate surface may be dark gray, owing to the very recent accumulation of vegetable matter. In general, however, the type contains very little vegetable matter, and has a whitish, lifeless appearance. The subsoil is a whitish or very pale grayish clay to silty clay. It is slightly mottled in the upper part with yellow and rusty brown, but at greater depth the color is uniformly a steel gray.

Included with this type are small areas that are seldom overflowed. If of sufficient extent to warrant separation, these areas would be mapped as the Myatt clay loam. On the first bottoms of Big Flat Creek are small areas of whitish or light-gray fine sandy loam, underlain by a gray clay mottled with rusty brown. Such spots might properly be mapped as the Bibb fine sandy loam if of sufficient extent to be shown separately.

This type occurs mainly on the first bottoms of Flat Creeks where the streams have cut deep channels into the soft rocks. The largest area is that northwest of Beatrice, in secs. 15, 16, and 17, T. 9 N., R. 8 E. The most typical bodies are those north of Scotland, between Robinson and Kearley bridges.

The surface is flat or depressed, and the drainage is poor. Water falling on the surface either passes away slowly through sluggish sloughs or remains until evaporated.

This soil is not extensive or important agriculturally. Approximately one-half of it has been under cultivation. About one-fourth is tilled at present, and the remainder supports a dense growth of aquatic oaks, cypress, swamp pine, magnolia, beech, ironwood, hickory, willow, and sweet gum, with a junglelike undergrowth of shrubs and climbing vines. There is some lespedeza, carpet grass, sedges, rushes, and broom sedge.

Because of its heavy character and wet condition this soil has largely been abandoned in recent years. When first cleared, before the Civil War, it was well leveed and drained by open ditches. Cotton and corn were grown, and in favorable seasons large yields were obtained. Part of the type is well supplied with lime.

Yields of one-half to three-fourths ton of hay and 10 to 15 bushels of corn per acre are obtained. Higher yields are often produced, but the occurrence of floods renders crops uncertain.

This soil is primarily in need of drainage and, in certain parts, liming. There is a tendency to use it to an increasing extent for pasturage and hay crops.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Bibb clay loam:

Mechanical analyses of Bibb clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
415333	Soil	0.2	2.2	1.6	16.2	19.7	42.9	17.3
415334	Subsoil	.1	.3	.4	10.2	8.2	37.8	43.4

OCHLOCKONEE FINE SANDY LOAM.

The surface soil of the Ochlockonee fine sandy loam is a grayish to grayish-brown fine sandy loam, from 6 to 10 inches deep. The subsoil is a grayish, heavy fine sandy loam to friable clay, mottled in the lower part with yellow, drab, rusty brown, and in some cases red. The material is constantly being changed by overflows. Colluvial accumulations occur along some of the smaller streams having no second terraces. The Ochlockonee soils are usually influenced by the nature of the upland soils forming the drainage basin of the different streams, and the soil and subsoil have a wide range in color, texture, and structure.

The Ochlockonee fine sandy loam is found along the larger intermittent streams and nearly all the continuously flowing streams. Overflows are of short duration, ranging from one day on the smaller creeks to three or five days on the larger streams. The drainage is poor to fair. The generally mottled condition of the subsoil is due to inadequate drainage. At depths of 4 to 6 feet the material is permanently saturated, and is bluish gray in color. There are numerous open ditches in areas of this type.

Approximately 60 per cent of the type is cultivated annually, and about 15 per cent additional is tilled at infrequent intervals. The untilled area supports a dense growth of hardwood consisting largely of oak with considerable sycamore, haw, hackberry, sweet and black gum, swamp maple, catalpa, and ironwood. Bay, swamp cypress, swamp pine, switch cane, and palmetto grow in the wet areas. During the summer months lespedeza and carpet grass, with sedges and rushes, and patches of Bermuda grass and Johnson grass furnish good hay and pasturage.

Hog and cattle raising is the main industry on this type. Hogs are pastured throughout the year, and cattle the greater part of the year. Almost all the tilled area is devoted to corn production. The minor crops are sugar cane, sorghum, velvet beans, cowpeas,

peanuts, and hay. The hay consists of wild grasses mainly crab, crowfoot, and carpet grasses, with some lespedeza, Bermuda grass, and Johnson grass. Mexican clover grows profusely in tilled fields and furnishes a fair hay substitute. Hay yields three-fourths to 1 ton per acre. Corn averages 15 to 20 bushels. Yields may reach 40 bushels per acre in the best seasons, while the crop may be a failure in wet years.

The usual shallow tillage is practiced. Fertilizers are applied at the rate of about 200 to 300 pounds per acre. With sugar cane the addition of nitrate of soda as a top dressing when the crop is about half grown is found profitable.

On this type the value of the standing timber is often greater than that of cleared land. In general, land values range from $10 to $15 an acre.

This is an important and widely distributed soil. Since the clearing of the uplands considerable areas of the bottoms have been covered with deep deposits of loose, droughty sand, or plowed soil has been washed away. Before the Civil War a system of levees was maintained to protect this land from floods. A system of open ditches with tile laterals every 25 to 35 feet has given highly favorable results in areas of this type in Noxubee County, Miss. The addition of vegetable matter and lime, with proper crop rotation are needed to maintain the productiveness of this type. Cotton was at one time an important crop but early summer floods often caused a partial to almost complete loss of the crop, so that cotton growing declined, and consequently the value of the type decreased.

OCHLOCKONEE CLAY LOAM.

To an average depth of 6 to 8 inches the Ochlockonee clay loam is a brown to dark-gray clay loam, usually high in organic matter. When wet the soil is slightly plastic, and when dry it crumbles readily. The subsoil is a plastic, tough clay, usually mottled drab and rusty brown in the best drained situations and mottled gray or bluish to yellowish in wet areas.

In the vicinity of small branches emptying into the main streams the type varies in both color and texture. The soil may be a fine sandy loam or a loam, and the color may be reddish near the Greenville or Ruston areas. Patches of Bibb clay loam too small to be shown separately on the soil map are included.

The Ochlockonee clay loam occurs along the larger creeks, where the bottoms are wide. It occupies flat first bottoms which are overflowed several times each year. The drainage varies from poor to fair. At depths of 3 to 4 feet the material is permanently saturated.

The Ochlockonee clay loam is not extensive. It is a strong soil and in favorable seasons produces nearly as heavy yields as the closely related Congaree silty clay loam. The forest and pasture growth are practically the same as on the Congaree soil.

Corn is the main crop, the yields ranging from 20 to 50 bushels or more per acre. The type is more dependable than the Congaree silty clay loam, owing to the shorter periods of overflow, the floods rarely lasting more than five days. Hay produces three-fourths to 1 ton per acre. Carpet grass and lespedeza furnish good pasturage. No fertilizers are used. The type is tilled in the same manner as other bottom-land soils. The type needs protection from overflow, and leveeing in some places should prove effective. Where staple crops are destroyed by flood, catch crops of cowpeas, sorghum fodder, or crops of like kind can be grown. The soil is well adapted to the production of ensilage.

CONGAREE FINE SAND.

The surface soil of the Congaree fine sand is a light-brown to light reddish brown fine sand, having a depth of about 20 inches. This is underlain by a yellow or reddish-yellow fine sand which extends to a depth of 3 feet or more without any noticeable change in color or texture. Mica flakes are evenly distributed throughout both the soil and subsoil.

Included with this type are small areas of the Congaree fine sandy loam, which is a dark-brown to reddish-brown soil underlain at 6 or 8 inches by light-brown or brownish-yellow clay loam or clay subsoil. An area of this soil is found on the west bank of the Alabama River between Bell Landing and Kings Log Landing.

The Congaree fine sand occurs as a narrow strip forming a natural levee along the banks of the Alabama River. The areas lie well above ordinary floods. There are numerous washes, or "breaks" formed by the overflow waters of high floods, which give the type a rather uneven surface. From the river bank the surface slopes back gently to a lagoonlike slough which is permanently wet. The soil has good drainage.

The greater part of this type is cleared and used for pasture and to a less extent for hay production. Lespedeza and carpet, nut, Johnson, and Bermuda grasses furnish good spring and early summer pasturage. Corn and velvet beans have been grown in small areas. Yields of 10 to 20 bushels of corn per acre have been reported. The native trees are willow, cottonwood, oak, hackberry, sycamore, and other hardwoods.

CONGAREE SILTY CLAY LOAM.

The soil of the Congaree silty clay loam is a dark-brown silty clay loam. The transition from the soil to subsoil is very gradual. At about 8 inches the color is a lighter brown, and at 20 to 24 inches the material is a yellowish-brown to grayish-brown silty clay loam. At greater depth, faint mottlings occur and soft, black iron concretions become increasingly plentiful. Both soil and subsoil are compact, but friable and brittle. Finely divided mica flakes are present. On the west side of the river from Bell Landing southward through Packers Bend, in secs. 11, 14, 20, and 22, T. 9 N., R. 6 E., the subsoil is a yellow clay with faint brown mottlings. This part of the type occupies a very high first bottom and is seldom overflowed.

The Congaree silty clay loam occupies the flood plains of the Alabama River, and extends up the larger tributaries as far as material is deposited by backwater of the river. The surface is flat to gently sloping. This is the lowest lying soil in the county. Although the movement of air and water appears to be very slow through the subsoil, the type usually appears well drained, and lacks the mottling characteristic of the terrace soils. The surface drains as rapidly as the recession of overflow waters permits. Numerous abandoned sloughs, and other areas too wet for tillage are shown on the map by swamp symbols.

The Congaree silty clay loam is an important type, although only 10 or 15 per cent is annually cultivated. Probably one-fourth the type has lain idle for several years, and is now covered with a growth of old-field pine, persimmon, sassafras, and gum. This and other parts are used for pasture. The forested areas support a dense growth of white, red, swamp or overcup oak, water oak, hackberry, magnolia, and sycamore, with cypress, bay, tupelo gum, black and sweet gum, slash pine, hickory, and willow in wet areas. Even those areas that have been allowed to lie out of cultivation on account of the frequency of flooding have proved well adapted to hay and pasturage crops. Lespedeza, carpet grass, Johnson grass, and broom sedge are the chief hay and pasture plants. Crab grass and crowfoot grass grow luxuriantly after intertilled crops and are often cut for hay, which is of fair quality.

Corn is practically the only crop grown. The yields vary widely, ranging as high as 60 bushels per acre on the best fields in some years. In other years the crop may be a complete failure. The farmers do not expect more than three full crops in five years, and the average return, taking a series of years, is about 20 bushels per acre. In case of a total loss of the corn crop, a crop of cowpeas may be grown. This crop will produce hay when planted as late as July. The pasturing of hogs and cattle is important on this soil.

Corn is planted on beds and given the usual tillage. No fertilizer is applied, and none appears to be needed for the production of good crops. The greatest need of this type is drainage and protection from overflow. It seems difficult to prevent overflows, but the drainage may be improved. Instead of the present method of bedding each row, making the beds wide enough for two rows, as is practiced in other sections, should prove advantageous. The pasture and hay land may be improved by seeding such crops as lespedeza and Johnson grass to displace the present volunteer growth. Owing to the compact nature of the soil, fall plowing, especially in the higher areas, should prove beneficial.

MEADOW.

The soil material of the areas mapped as Meadow is so variable in texture, structure, and color that it can not be spearated into definite soil types. Along streams traversing the sandy upland areas Meadow varies from sand to fine sandy loam, while along steams in the heavier areas the soil varies from fine sandy loam to clay. The material is subject to modification during each overflow by the addition of sediment or the removal of the old material. Some productive areas have been rendered practically valueless by the washing in of deep deposits of sand.

Meadow occurs in narrow strips in the first bottoms of streams, being well distributed throughout the county. All of it is subject to overflow, and a large part remains wet during the greater part of the year.

A small percentage of Meadow has been cleared and reclaimed, and is used for the production of corn, sugar cane, and grass. The greater part is used as summer pasture for cattle. The native growth of water-loving trees affords shade for the animals. Some native hay is cut. The yields of corn are satisfactory, but the crop is more or less subject to injury or total destruction by summer floods.

SUMMARY.

Monroe County is in the southwestern part of Alabama, about 75 miles north of the Gulf of Mexico. It contains 1,012 square miles, or 647,680 acres.

The topography ranges from prairielike to rough. About one-sixth of the county is untillable, one-sixth is flat land, and the remainder is rolling to hilly. About 60 per cent of the total area is topographically well suited to cultivated crops. About 80 per cent of the county is upland, the remainder consisting of terraces and bottom land.

A small part of the county is drained by the Escambia River, the remainder by the Alabama and its tributaries.

The railroad transportation facilities are good. The extreme northeastern and southwestern parts are most remote from railroads. A part of the county has river transportation. The main wagon roads are surfaced. The roads are being systematically improved.

According to the 1910 census the total population is reported as 27,155. Over half the population is Negro. The population averages about 27 to the square mile. No section is tilled to the limit of its capacity, and there are large areas of good soil awaiting development. Monroeville is the county seat and largest town.

The climate is typical of the southern part of the warm temperate zone. The mean annual rainfall is about 51 inches. The precipitation usually is well distributed throughout the year, though the yields of some crops may be lessened by droughts. The mean annual temperature is about 65° F. There is a normal growing season of about 240 days.

Cotton was for years the chief money crop of the county. The boll weevil has curtailed cotton production, and caused a marked change in the agriculture. In general, diversified farming prevails in the southern part of the county and stock raising in the northern part. Corn is the chief crop. The food products are insufficient for local needs.

Crop rotation has not been practiced, but is beginning to receive attention. Fertilizers are in common use. Large areas are in need of organic matter and protection from erosion. There is a general need for modern farm machinery and heavier work stock.

In 1910 there were 4,613 farms in the county, averaging about 95 acres in size.[1] About 68 per cent of the area of the county is in farms, and of the farm land 37.5 per cent, or an average of about 36 acres per farm, is improved.

About 40 per cent of the farms are operated by the owners, and practically all the remainder by tenants. The number of farms operated by the owners is increasing. Land values vary widely; the average assessed value of farm land is reported in the census of 1910 as $7.55 an acre.

Twenty-seven soil types, representing 17 series, exclusive of Meadow, a miscellaneous type, are mapped in this county. The soils have a wide range in texture and structure, and are capable of supporting a widely diversified system of agriculture.

The Greenville fine sandy loam is an extensive soil, and is important in the agriculture of the county.

The Susquehanna soils are the most extensive in the county. They are adapted to pasturage, forestry, and general farming.

[1] Each tenancy is rated as a "farm."

The Orangeburg soils also cover a large total area. They are suited to the production of fruit, especially Elberta peaches. The flat phase of the fine sandy loam comprises some of the best land in the county.

The Norfolk series includes gray soils with yellow subsoils. These soils are well suited to crop production, but the sandy areas are in need of organic matter, and the flat areas require drainage.

The Ruston series is intermediate between the Orangeburg and Norfolk on the one hand and the Susquehanna on the other. It includes gray to brownish-gray surface soils, and reddish-yellow to yellowish-brown subsoils.

The Guin and Lauderdale soils are of wide extent, but of low agricultural value. The Plummer and Grady soils are greatly in need of drainage.

The Chattahoochee, Cahaba, Kalmia, and Leaf series are terrace soils. The Chattahoochee and Cahaba soils are relatively extensive. They are in need of drainage, liming, and the restoration of organic matter. The Myatt soil is also poorly drained.

The first-bottom soils are classed with the Ochlockonee, Bibb, and Congaree series. The first need of these soils is protection from overflow, which is only in part possible. They produce good yields, but under present conditions the farmers expect only about three crops out of five to succeed.

Meadow consists of widely variable material, but is agriculturally as important as any of the other bottom-land types. Crop yields are more certain, and the land is generally more easily reclaimed.

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[PUBLIC RESOLUTION—No. 9.]

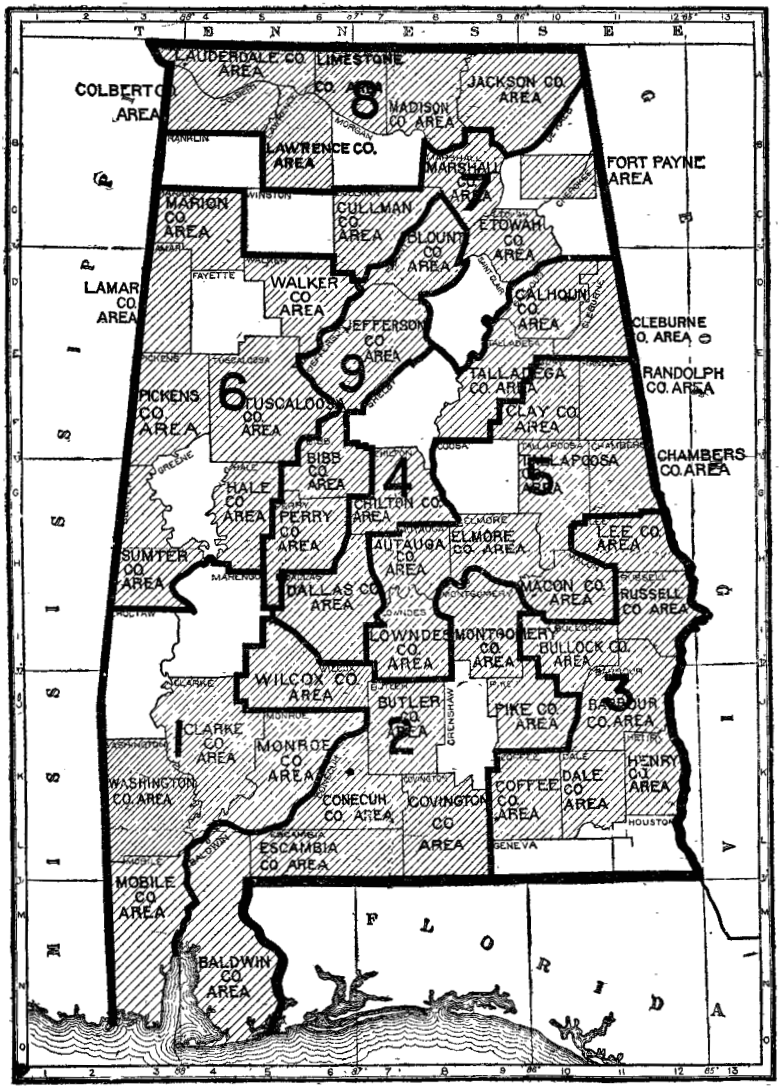
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]



Areas surveyed in Alabama.

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U.S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
ALABAMA
MONROE COUNTY SHEET

STATE OF ALABAMA
CHARLES HENDERSON, GOVERNOR.
J. A. WADE, COMMISSIONER.
AGRICULTURE AND INDUSTRIES.
EUGENE A. SMITH, STATE GEOLOGIST

W. Edward Hearn, Inspector, Southern Division.
Soils surveyed by Howard C. Smith in charge, and Austin L. Patrick, of the U.S. Department of Agriculture, and J. F. Stroud, of the Alabama Department of Agriculture and Industries.

Scale 1 inch-1 mile

Field Operations
Bureau of Soils
1916